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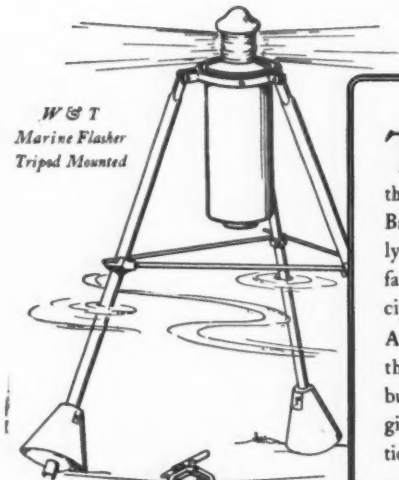

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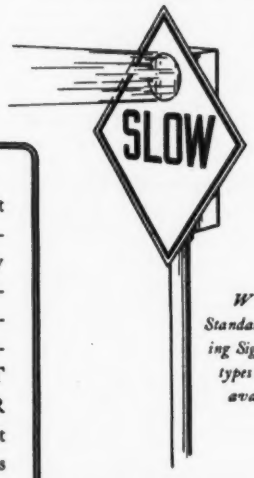

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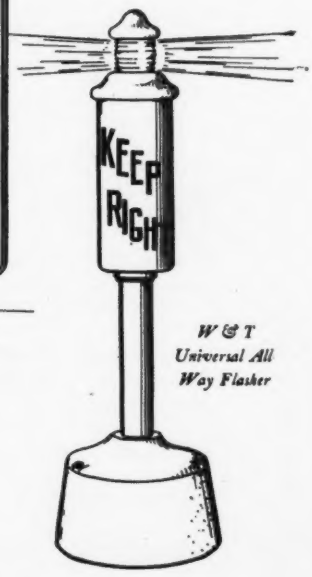

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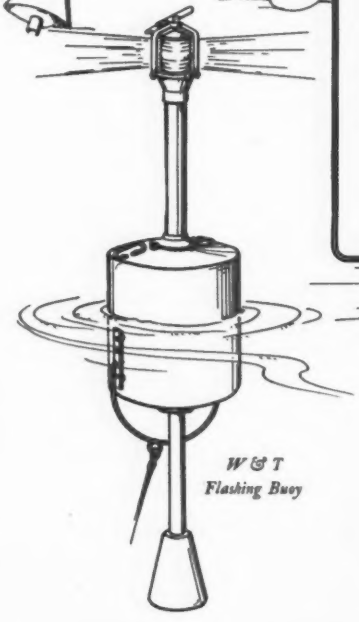

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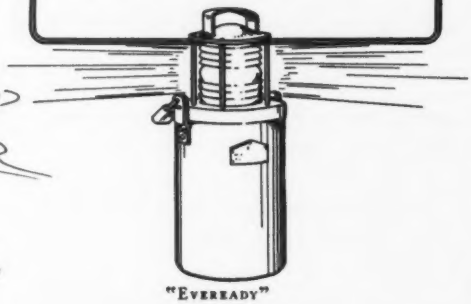

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 103 NEW YORK, AUGUST 15, 1929 Number 7

A Union Responsibility

ORGANIZED labor has a very definite responsibility in conforming to pacts and conditions as agreed to with employers. This responsibility calls for a sane self-government capable, as was demonstrated in New York last week, of squelching an insurgent minor group threatening the peace of a city-wide organization by unreasonable demands. It is the duty of a union to champion just rights of its members, but in this case an agreement giving the entire building trades of the city a five-day week and a 10 per cent wage increase was jeopardized by one local of electrical workers demanding certain conditions without submitting to arbitration—a violation of one of the main pacts between labor and employers. The union council took the affair into its own hands, and in due time told the offending local to get out or conform to the rules. The latter course was chosen. Much of the opposition to organized labor can be attributed to past irresponsibility on the part of the unions. Capable self-government within labor's ranks will do much to lessen this opposition. On the other hand, lack of self-government will obstruct or make impossible the achievement of organized labor's purpose.

Two New Toll Bridges

TWO important additions to the list of interstate toll bridges will be made within the next two weeks by the opening of the Lake Champlain crossing and the new Delaware River bridge at Tacony. Both have interesting relations to the recognized problems of toll bridges. The former is a public enterprise, the latter private. In both cases the states involved—New York and Vermont in the first, Pennsylvania and New Jersey in the second—are on record as opposed to private interstate toll bridges. The Governor of New York emphasized this position a few days ago by declaring in favor of a toll bridge over the St. Lawrence to be built jointly by Canadian and New New York authorities, instead of by private capital. The Champlain bridge, undertaken by a commission of the two states concerned, is thus a logical outgrowth of established public sentiment and governmental policy. The Tacony bridge, on the contrary, is at odds with this sentiment and policy, which appear to have the same strength in Pennsylvania and New Jersey as they do in New York and Vermont. The former two states, until a dozen years ago connected only by private toll bridges across the Delaware, became so dissatisfied with this condition that they set up a joint board to make the bridges toll-free by purchase, a task now nearly completed. They further expressed their attitude some years later by combining to build the Camden bridge, and at that time the feeling in Philadelphia and more generally in Pennsylvania against tolls was so strong that only after a bitter contest was New Jersey able to insist on the toll-refunding plan. The departure initiated by the Tacony bridge is thus something of an exception, especially since the large earnings of the Camden bridge have placed the toll-refunding plan in a highly favorable light. Considered in conjunction with developments elsewhere, the score therefore is more in favor of public than of private toll-bridge construction.

Capitalizing Overtime

PUTTING overtime to economic service is not often undertaken purposefully. Ordinarily the builder regards overtime with its time-and-a-half and double-time wages as a device to be employed only in a drastic emergency. In the Brooklyn factory-building operation described this week it was calculatingly used as a money-saving procedure of ordinary construction. The practice deserves appraisal as a deliberate agency for economic saving. Obviously, cost thinking should rightly be carried beyond the mere matter of the price of putting steel and masonry and timber together to create a designed structure; the cost of business interruption and lost profits is fully as important. In the present instance there was business at hand which was of direct value to the factory owner to the amount of its profits and of indirect value as patronage maintained for the factory. It is logical to include these values as part of the cost of construction. Accordingly they were weighed against the cost of the overtime work which would be required to complete the building in time to secure the business, and where the balance so indicated overtime work was undertaken. Interesting in itself as an excellent example of building construction management, the operation described is of much greater value in extending the conception of construction cost to include investment value. Though the subject has many ramifications which cannot be indicated here, it is permissible to say as a broad conclusion that if contracting is to perform the high function to which it aspires in engineering construction, it must carry its service beyond mere price shaving and lead the way to maximum economic saving in construction.

Heavy Column Tests

A REMARKABLE series of steel column tests relating to the design of the Fort Lee-Hudson River suspension bridge and the Kill van Kull steel arch bridge is being carried out by the testing staff of the Port of New York Authority at the Bureau of Standards in Washington. Specimens of unprecedented size, utilizing carbon, silicon and manganese steels, offer a valuable opportunity to check column design theory and to observe the action under load of two of the most promising alloy steels. Involved in the tests are ten Fort Lee bridge tower-leg sections and two bottom-chord sections of the Kill van Kull arch, all half actual size. Six of the Fort

Lee specimens are bare and four are solidly incased in reinforced concrete, the latter affording opportunity to determine what additional strength is imparted to a steel column by filling and surrounding it with concrete. The Kill van Kull chord sections, of manganese steel, have a sectional area of 155 sq.in. and are approximately 21 ft. long. They failed just below the 5,000-ton capacity of the machine at unit stresses of 58,640 and 59,000 lb. respectively; the yield point of the steel is 59,000 lb. Failure occurred through the buckling of the widest plates in the members, in uniform waves approximately equal in length to the width of the plate. Such unusual harmony between theory and action in large members is gratifying indeed; it is eloquent testimony to the high excellence attained by structural engineering and increases faith in the resistance of large columns.

Hydraulics on a Large Scale

A MILE-AND-A-HALF length of overfall dam, to carry a discharge depth of 8 ft. and deliver a quarter-million second-feet, is something so unusual as to engage closest attention. Bonnet Carré spillway justly rates as an engineering enterprise of rare magnitude. It is the more interesting because building an overfall dam on soft-ground foundation has always been a difficult task, and probably always will be. Against foundation weakness the stepped log-crib dam of earlier generations proved itself excellent, as did, later on, the Laguna type of broad chute; both met satisfactorily the requirements of stability as well as of resistance to uplift and percolation. But the difficulty of dissipating the energy of the falling water remained—and how few dams are free from serious toe erosion! Naturally, then, the toe scour problem was the prime point of study at Bonnet Carré, where the steeply profiled gravity type of weir was selected. Large-scale laboratory testing was resorted to as a preliminary to design. The adopted solution relies on baffle piers to localize the turbulence close to the end of the fixed apron. Actual experience with scour later on will furnish valuable data on the effect of jump location upon erosion intensity. Several other major hydraulic problems received attention in the experimental work. As to uplift, however, no direct studies appear to have been made. In spite of the presence of much permeable ground in the subsoil, the designers, evidently fearful of the bearing capacity of the soil, kept down the weight of their structure to a very minimum. As a result it is not heavy enough to balance full hydrostatic head at high river stages before the needles are opened, and the security of the structure is contingent on preventing development of uplift by tightness of the subsoil and sealing effect of the sheet-pile cutoffs, or else on the downward anchorage of the dam by the bearing piles. These factors being not capable of exact estimation in advance, their sufficiency will have to be learned from actual service.

Spillway and "Fuseplug"

IN A broader aspect the Bonnet Carré structure, the only controlled spillway in the Mississippi flood-control project, contrasts sharply with the famous Jadwin "fuseplug" levees that are to be used at the three upper diversions. These "fuseplugs," it will be recalled, are merely low sections of levee, which are expected to breach spontaneously and thereby divert excess flood flow into designated floodway channels. By now it is fairly well known that this famous plan of General Jadwin's had the effect of making a point at law—namely, supporting the claim that the floodway lands will be fully as well protected as in the past, despite the fact that the project is deliberately intended to concentrate the entire diversion flow over these lands and utilize them as the bed of a recurrent channel. Later in the present month this paradox of equity will have its first test in court. Meantime it is of value to note that the protection of New Orleans will not have to depend on such automatic washout action but is to be managed by a structure giving definite control of flow. Whether this is because New Orleans is so important as to warrant a dependable means of protection we are unable to say. But there is no levee-raising in the New Orleans reach, and hence no way to produce "fuseplug" conditions except by lowering or weakening some part of the levee, which would very likely be opposed by the people who live under the protection of that levee.

Another Goethals?

WASHINGTON reports have it that another Goethals is wanted to take charge of the Mississippi River flood-control work. That is why no one has been nominated Chief of Engineers to succeed General Jadwin. Some forceful young officer from the Corps of Engineers, or possibly even a line officer, is to be promoted over the officers now heading the list of colonels in the Corps of Engineers—so goes the rumor. It finds substance in the fact that General Deakyne has been made only acting Chief of Engineers.

Why another Goethals? It is not in the *execution* of the Mississippi flood-control work that the fault lies, but in the plan itself. The execution is in the hands of competent engineers up and down the River. What they need most now is a chief who by his open-minded approach to the unsolved problems of flood control will help to free them from the onus of the maneuvering which defeated the evident will of Congress and put the present plan into effect. The need for such action is so obvious that it should not be necessary to seek far for an officer alive to its desirability. General Deakyne or Colonels Kutz, Ladue or Barden, the natural successors to the chief's job, all are able men who can be expected to profit by the experience into which blind following of the Coolidge "economy" program led the past administration.

And what of the spirit and tradition of the Corps? Shall the ability and sense of responsibility which its service develops in those who have given it their lifetime effort be coldly disregarded? Over and against any possible advantages of taking some happily discovered superman and placing him in command of the Corps must be set the demoralization of the Corps which will result from passing over the able men now in line for the Chief of Engineers' place. Promotion by seniority, so long as a man does his work ably and well, is the basic scheme around which the solidarity of the Corps is built. From colonel down to young lieutenant, the hope of each that he may some day become Chief of Engineers has inspired the members of the Corps to put up with the hardships and moderate pay of the Corps and has kept many of the older men from leaving to accept more lucrative positions in civil life. And it has created the spirit which has kept the Corps remarkably free from partisan politics. To take away that inspiration

from the younger men, to play false with the older men, would demoralize the whole body. The entire profession of civil engineering is concerned in this issue. Distinctions between civilian and soldier disappear when the well-being of a great organization is threatened. *Engineering News-Record* feels that its pride in the record of the Corps gives it warrant for asking that the soundness of that body of men be not impaired.

No, another Goethals is not needed. The men of the Corps who have carried on to this point can be expected to continue the execution of the flood-control plan. It may be true that their hands are tied in so far as modification of the present plan is concerned, but that is true also of the sought-for new dictator. President Coolidge and General Jadwin saw to that. What is needed most now is that the men on the River be permitted to do their plain duty—to carry out quickly and efficiently those features of the flood-control plan upon which everyone is agreed pending a thoroughgoing review of its doubtful features. Responsibility for the inauguration of that review, as we pointed out two weeks ago, rests squarely upon President Hoover. And it is the President also who now has the welfare of the Corps in his hands.

Recording Contract Performance

BY ORGANIZING and financing a bureau of contract information the surety division of the Associated General Contractors offers engineers and contractors a definite opportunity to serve construction. The division proposes to operate the bureau as a fact-finding agency, organized in harmony with the A.G.C. but as a separate corporation. It will aim to compile reliable information on contract performance of constructors doing work in the United States. This information is to be furnished to bonding companies, public officials, engineers, architects and other contracting agencies properly entitled to have it. All information furnished will be purely factual, without recommendation, favor or prejudice. For each contractor the record available will be a summary of the facts of his business, on which a surety company or contracting agent can base decision to bond him for performance or to award him a contract. It is for this function and purpose that the bureau and its sponsor organizations claim co-operation.

For years contract bonding practices have been confessedly unsatisfactory both to the bonding companies and to those who sought their guarantee for contract performance. Default, court action and delay have been common experiences in bonded construction. Chiefly these evils have been the result of unwise surety-bond writing; contract performance has been guaranteed without reasonable assurance that the contractor was in a favorable position as to finances and as to experience and resourcefulness to give the service guaranteed. Surety losses due to causes beyond determination and control have been comparatively small. Unwise surety-bond writing has been and is due to incomplete or incorrect knowledge of the reasonable ability of the contractor to fulfill his contractual obligations, for no sane bonding agent will guarantee a contract that he knows is impossible to carry out. It is in meeting this situation that the bureau of contract information has its useful place in the construction business.

Obviously the information must come from the contractor and the agencies which employ the contractor. They should give it freely, because the gain ultimately is theirs—the contractor's because he is measurably relieved from the competition of the inadequately financed and unskilled constructor; the engineer's because he has measurable assurance that the bond furnished with the contract signifies a contractor selected for his good performance record. The criterion of successful performance likewise places the small contractor in as high a rank of integrity as the man who is organized and financed to undertake larger operations. This is essentially common sense and fairness.

It cannot be expected that the bureau of contract information will cure all the ills of contract bonding, still less that it will cure all the ills of contracting. But it is a purposeful step toward eliminating one factor of a complex problem and deserves fair trial and the support of engineers and contractors.

The task of compiling and keeping accurate thousands of records of contract performance is a stupendous one; their honest use will be a test of the highest order of the judgment and integrity of those who grant the privilege of use and of those who use them. Any lowering of high standards in creation and use of the records will spell their disfavor with those whose favor is required if the information on which they are based is to be freely given. Good faith and diplomacy and a large amount of educational work are vital. Given these essentials, hope of a real improvement in contracting practice is offered by the new venture.

About Waterway Policy

A CORRESPONDENT asks why *Engineering News-Record* is against waterways. The answer is that we are not against waterways. We believe that whenever a waterway is proved to be desirable and economically advantageous, it should be built. We also believe that when its desirability is doubtful, the enterprise is a frank experiment and may well be opposed if there are better uses for the money; and that when the doubt is so great as to amount to virtual certainty that the waterway in question will not pay its cost, it should be opposed.

These statements are put in plain terms in order that they may be clear, not only so that our own attitude may be beyond mistake but also so that others may be led to take an equally definite and clearly understandable attitude. It is essential, in our opinion, that all thinking and talking on waterways, whether in general or on a specific project, be clear and sound. The situation is, and long has been, that waterway discussions revolve wholly about the spending of other people's money, a proceeding that always seems very desirable and is easy to justify to oneself, but less easy to justify to one's neighbor; and as a consequence the neighbor, if he shows himself to be unconvinced, is likely to be set down as stubborn or prejudiced.

Were any waterway advocated as a commercial venture to be built with private investment money—as any railway or power plant is built—few would oppose it. Few even would question it. When government money is demanded to build it, the question is entirely fair whether the enterprise will pay. And this question, we believe, is entitled to a convincing answer. As we said in commenting on the waterways discussion at Milwaukee a few weeks ago, the facts need to be carefully sifted from the half-truths in establishing the real value of such undertakings.

Planning a Huge Diversion Weir
Bonnet Carré Spillway

Hydraulic Tests of Many Dam Sections—Tests on Dentated Sills as Energy Dissipators, Toe Protection Devices and Soil Properties—Design Factors and Spillway Structure

By W. W. De Berard
Associate Editor, Engineering News-Record

The Bonnet Carré spillway, discussed in this article, is the hydraulic device adopted in the official Mississippi flood-control plan to keep down the flood crest level at New Orleans to El. 20 as a maximum, and so avoid the necessity of raising and enlarging the city's main levees. Riverfront business and structures are adjusted to the present levee height, and to increase this would involve heavy costs and much disturbance of harbor operations.

Spillways at New Orleans were provided for in both the Mississippi River Commission plan and the Chief of Engineers' plan for Mississippi flood protection. In the plan of the Chief of Engineers (Dec. 1, 1927) only one spillway was provided, located at Bonnet Carré, 28 miles upstream from New Orleans, and discharging into Lake Pontchartrain. The plan of the Mississippi River Commission called for two spillways, one at Bonnet Carré and one downstream from the city, at Caernarvon, where the river levee was artificially breached in the 1927 flood to reduce the predicted dangerous crest level at the city. After the passage of the flood protection act in 1928, the review board of engineers authorized by the act reported in favor of the Chief of Engineers' plan, and thereby indorsed the single spillway at Bonnet Carré. This is the structure now being built and which is discussed in this article.

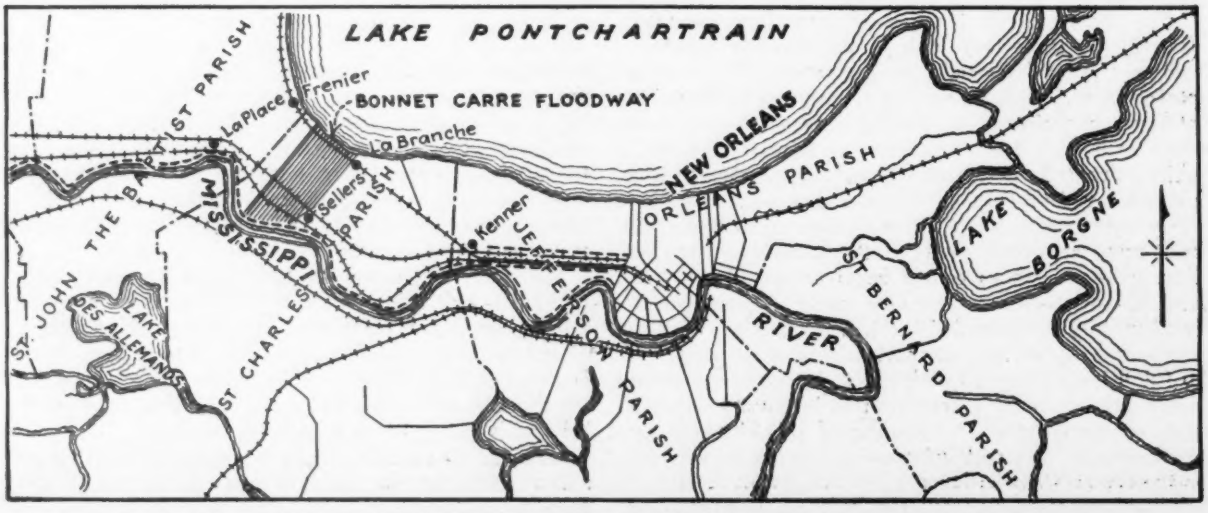
Confusion in understanding some of the geographical allusions will be prevented if the orientation of city, spillway, lake and river is clearly in mind. This is shown by the map at the bottom of this page. New Orleans, as is known, is on the east side of the river, and the Bonnet Carré spillway is on the same side and upstream. As the river coming south swings east well above New Orleans and does not turn south again until well below the city, there exists the apparent contradiction of the city and spillway on the east side of the river lying directly east and west from each other and having the river to the south. With this feature of local geography clear, there need be no confusion of the references in the present article. —Editor.

Complicated structural and hydraulic problems were involved in the design of the Bonnet Carré spillway. In addition, the acquisition of right-of-way required an interpretation for the first time of many clauses of the flood-control act.

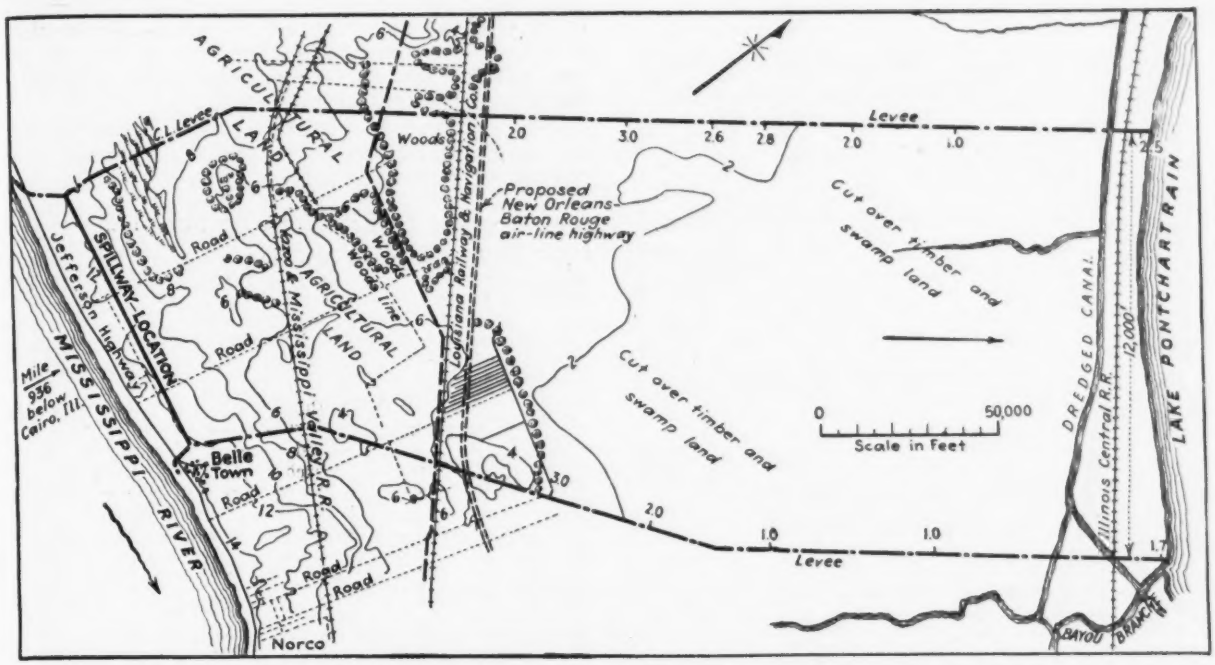
It was not until June of this year that the legal department of the government began to turn over property acquired for the site. Bids for the last of the main contracts were asked for on July 8. This was nearly a year after funds for the project were turned over to the New Orleans River District. Some criticism of the delay has arisen; however, engineering work has kept pace with the legal negotiations, and both have been completed at about the same time.

A year was not too long a time to survey the site, solve all the hydraulic questions of backwater curves in the 6-mile stretch of floodway, determine upon a proper cross-section of dam, and through experiment devise means of reducing the critical discharge velocity of the water so as to avoid undue scour, after the scouring velocities had been learned. Studies had to be made of downstream scour and of silting, though prevention of the latter may probably best be studied during and after the first flood. The design of the structure by reason of the character of foundation material also required that many tests and observations be made of bearing power, scour and permeability.

To determine all of these various factors a weir-test-



LOCATION OF BONNET CARRÉ FLOODWAY AND CITY OF NEW ORLEANS IN RELATION TO THE RIVER AND LAKE PONTCHARTRAIN



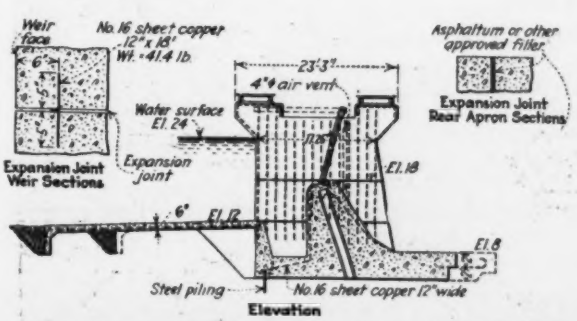
WEIR AND FLOODWAY LOCATION PLAN AND TOPOGRAPHY, BONNET CARRÉ SPILLWAY

Location 28 miles upstream from New Orleans. Opening 350 weirs 20 ft. between piers, or 7,000 ft. Floodway area 7,860 acres. Maximum levee height 19.3 ft.; aggregate length 11½ miles. Numbers along levees indicate surface elevations.

ing flume was set up, a hydraulic laboratory was built and many soil tests, borings and surveys were made. This article details the more salient results of these researches, tests and observations and describes the design of the dam which was finally decided upon.

The spillway, which is a concrete dam located on the north, or left, bank of the Mississippi River, 28 miles upstream from New Orleans, is being built primarily to protect the levees at New Orleans from flood heights in excess of 20 ft., equivalent to 24 ft. at the dam; these heights are measured from mean Gulf level.

The flood-control program provides for a maximum flood of 3,000,000 sec.-ft. at the mouth of Red River, 200 miles upstream. One-half is to come down the Mississippi, but only 1,250,000 sec.-ft. is to go by New Orleans, 250,000 sec.-ft. being spilled into Lake Pontchartrain at Bonnet Carré before reaching the city. Of the other half, the Atchafalaya River is to take 500,000 sec.-ft., the west floodway 600,000 and the east floodway 400,000 sec.-ft. "Fuseplug" levees at the heads of the floodways are to break at El. 57.5 on the Angola gage in the Mississippi below the mouth of Old River. This 57.5-ft. gage is estimated to send a 1,500,000-sec.-ft. discharge down the Mississippi.



DETAILS OF WEIR SECTION AND EXPANSION JOINTS

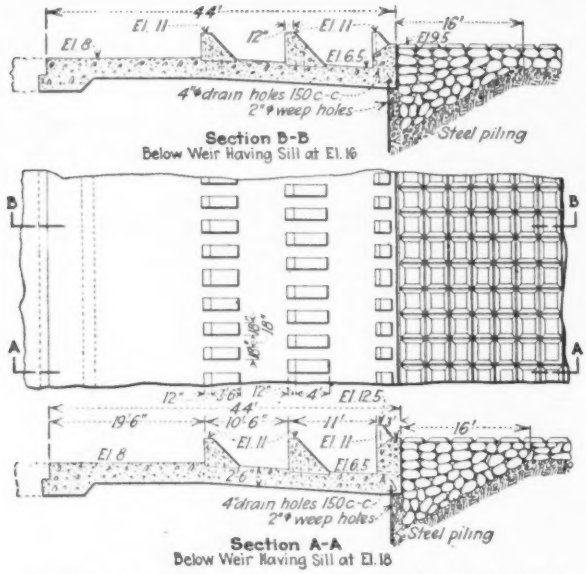
Inasmuch as Bonnet Carré spillway was not intended to be a factor in handling the Atchafalaya portion of the floodwater, it was designed to operate as infrequently as possible and only when the New Orleans gage reaches 20 ft. This restriction of operation is to reduce silting of the floodway to a minimum and thus surely retain its full capacity for the one function.

Weir and Levees—The spillway and floodway plan is indicated by the accompanying map, which gives dimensions and areas and shows the floodway topography. The spillway structure proper consists of a concrete dam with a pier-and-weir section 7,700 ft. long. The weir sections are 20 ft. wide between piers and carry needles on crests at two levels, El. 16 and 18. The different sill elevations are explained in a statement from the office of the Chief of Engineers as follows:

> Movable dams are usually built with different sill elevations because of the greater flexibility in operation and regulation that this affords. The higher sill is more easily operated, and frequently the lower sill does not have to be operated at all. If it comes into operation, there is a tailwater that facilitates the operation of the deeper dam sections.
>
> At Bonnet Carré, having part of the sill low affords some extra discharge section which is over and above the prescribed discharge capacity. In many floods it will not be necessary to operate the lower sill, but it will be available for superfloods. It is probable that the Bonnet Carré spillway will afford all the discharge capacity necessary for many years to come by removal of intermittent needles with all the needles removed sometimes from the higher sills.

Side levees 12 to 19 ft. high, 1½ to 2½ miles apart, guide the discharge through a floodway a distance of 6 miles to the lake. Once in five years, it is expected, the dam will operate during a period of one to three months. To start the discharge, the timber needles, 12 in. wide, will be lifted from their seats (steel I-beams between piers at the top and a notch in the concrete crest at the bottom) by a traveling crane operating on a bridge spanning the intervals between piers.

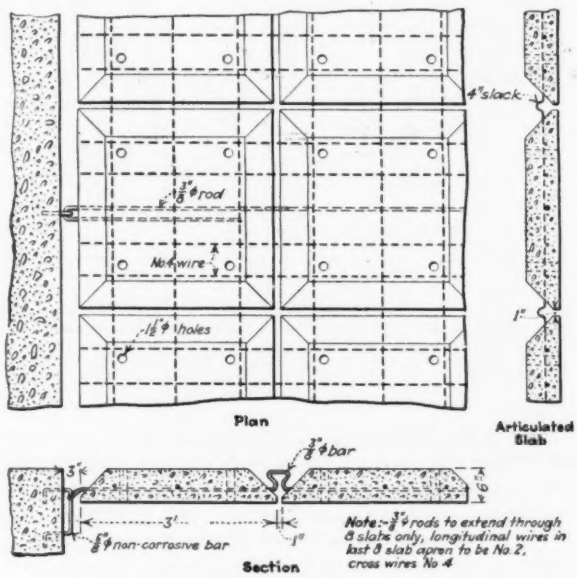
Research Necessary—The Fremont and Sacramento spillway weirs of the Sacramento flood-control system


Section B-B
Below Weir Having Sill at El. 16
Section A-A
Below Weir Having Sill at El. 18
4" drain holes 15'0 c-c
2" weep holes
Steel piling

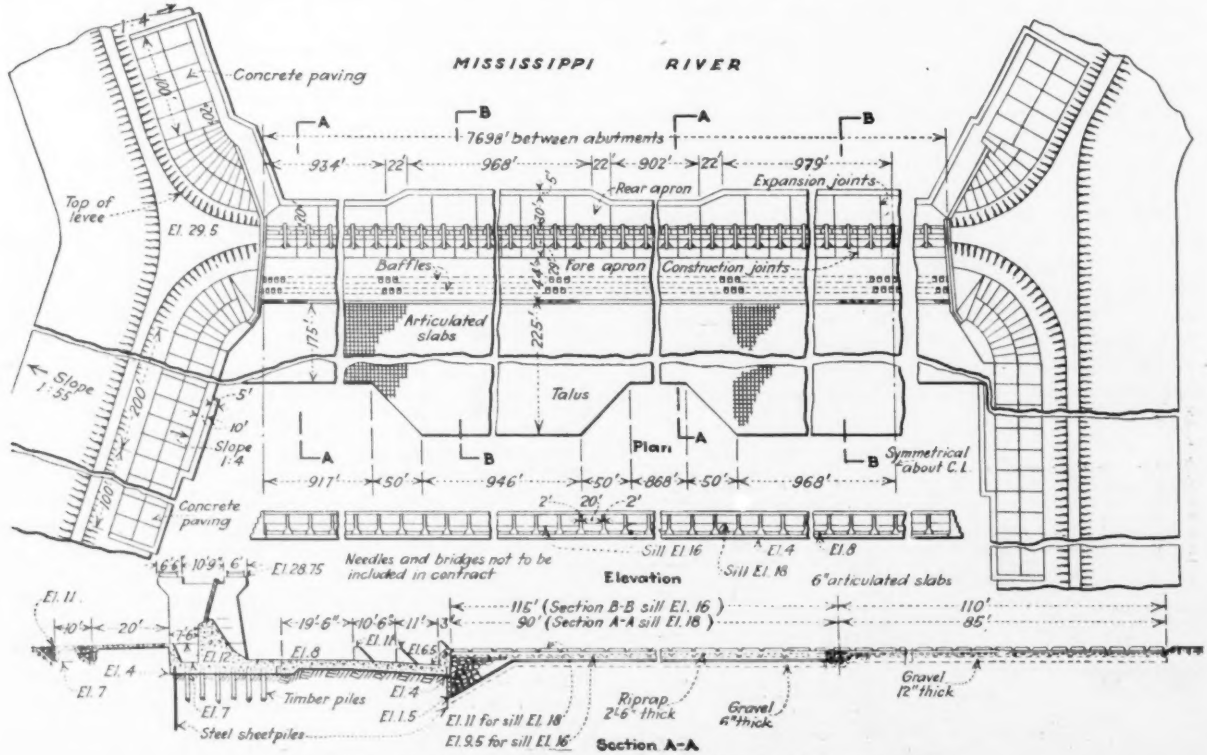
DETAILS OF FORE APRON, BAFFLES AND DENTATED SILLS

in California have many points in common with that at Bonnet Carré. However, the latter passes more water and the foundation materials scour more easily. Also, it was felt, several improvements were possible, as for instance in more effective velocity reduction with consequent less downstream toe erosion. The main hydraulic tests were therefore directed toward these points and also toward the development of riprap and concrete mat protection—it was believed that no harm could come to the dam if the percolation path were not short circuited by downstream undercutting. Tests were also made on the discharge of various weir sections under different degrees of submergence, since the operation of the floodway is almost sure to produce a cycle of free flow, partial submergence and full submergence.

Close examination of foundations was dictated by the fact that four crevasses have occurred near this site, and two others recently at Hymelia, on the opposite side of the river. The last of those at Hymelia was a sand-boil break, and of the four on the north bank (1851, 1859, 1871 and 1874) the last remained open eight years, depositing silt to an irregular depth of 2 to 10 ft.


4" slack
Plan
Articulated Slab
Section
Note: rods to extend through 8 slabs only, longitudinal wires in last 8 slab apron to be No. 2, cross wires No. 4

ARTICULATED CONCRETE SLAB PAVING



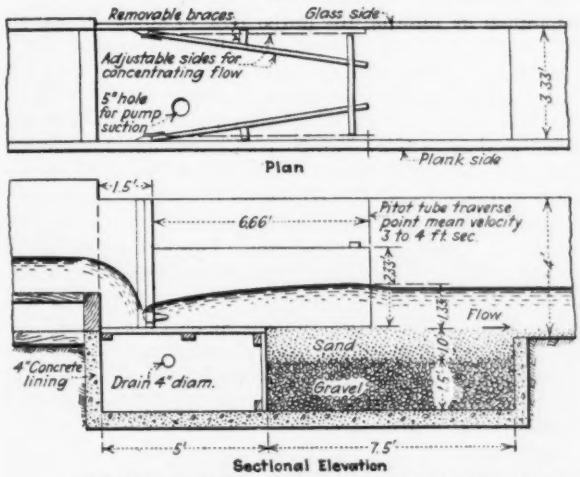
BONNET CARRÉ NEEDLE DAM WEIR TO PASS 250,000 SEC.-FT.

Note the two weir crest heights (El. 16 and 18) and two widths of corresponding weir apron and articulated slab zones.

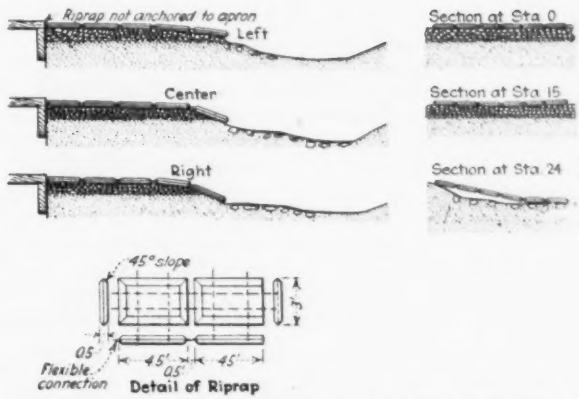
While a layer of good clay varying in thickness from 15 to 30 ft. blankets the surface at the weir site, there is below the clay a layer of sand which runs easily and through which percolation must be prevented. These conditions required tests on bearing power, scour and permeability, and were primary factors in the design.

Hydraulic Factors

In the laboratory, where the primary purpose was to devise means to dissipate the energy of water falling over the dam, more than 100 runs of two to five hours' duration were made during the first six months of the year. One flume built to one-sixth scale was used in working out details of the stilling basin and baffle design; a second flume, on one-twentieth scale, represented twenty spillway openings. The two scales gave a chance to compare similar factors. In the smaller-scale model the distribution of the water and the effects of different combinations of sill elevations and eddy action were determined.



PIT FOR TESTING RIPRAP AND CONCRETE MATS FOR TOE PROTECTION



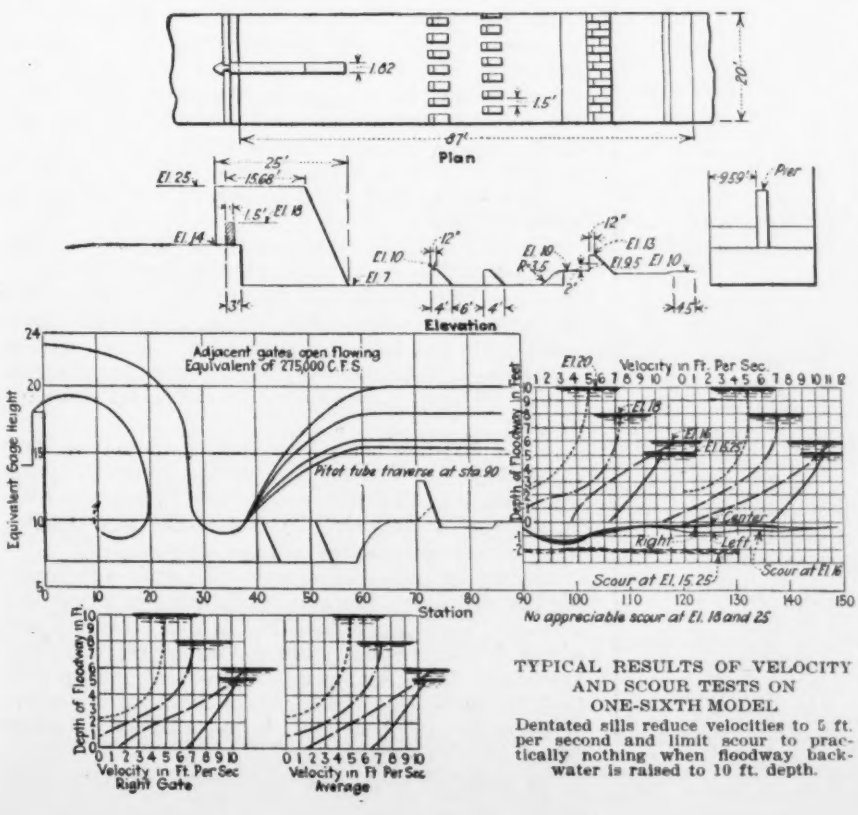
TYPICAL TOE PROTECTION TEST OF SLABS OVER GRAVEL

Flexible concrete slabs laid over 3-in. bed of ¾- to 2½-in. gravel used as filler for 2-ft. bed of 2½- to 6-in. stone, in turn over 3½-ft. bed of ¼-in. sand. Test for three hours was equivalent to 10 ft. per second

Dentated Sills—The principal tests were those on the design of the downstream apron to determine the exact location and dimensions of stilling baffles to set up "ground" and "surface" rollers to throw the water against itself. Rows of hinged baffles could be raised or lowered from the bottom of the stilling pool by a hand lever. Pitot tube traverses were taken along different planes below the stilling pool to determine the effects produced by changing the baffle positions or heights. Two rows of baffles 3 ft. high were found to effect a 40 to 50 per cent velocity reduction. The baffles are decidedly cheaper than the usual long extension of riprap protection. Scour profiles were made in graded sand at the end of the apron to check the Pitot tube readings.

Some of the points determined for dams of the size and characteristics of the spillway are that the hydraulic jump is not an effective means of dissipating the energy below the spillway, that an ogee weir is not so good as straight downstream face due to eddies under the nappe and that a curved wall at the lower end of the stilling pool is not so effective as a straight one.

Weir Coefficients—No agreement was found between coefficients of discharge over the submerged weirs of the models and the coefficients obtainable from available sources. An ogee under a head of 6 ft., according to the best available information, gives a discharge coefficient c in the Francis formula of 3.8 to 3.97 under



TYPICAL RESULTS OF VELOCITY AND SCOUR TESTS ON ONE-SIXTH MODEL

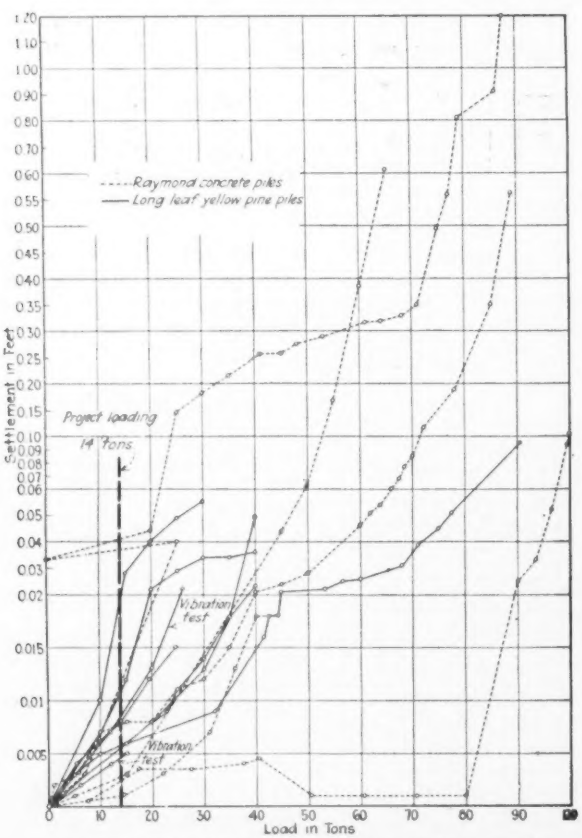
Dentated sills reduce velocities to 5 ft. per second and limit scour to practically nothing when floodway backwater is raised to 10 ft. depth.

free-flow conditions. The value of c would decrease to 3.1 on two-thirds submergence and would continue to decrease up to about 50 per cent of free-flow value, provided an equilibrium were reached between discharge capacity and backwater elevation. Under these assumptions of constants, flows of 375,000 sec.-ft. under free-fall conditions would be had at Bonnet Carré, reducing to 280,000 sec.-ft. for two-thirds submergence and to the designed capacity on full submergence. The latter condition is brought about when the maximum value of n is assumed for the discharge channel; then the backwater would build up to the point where the gradient approaches the natural channel flow from the river to the lake.

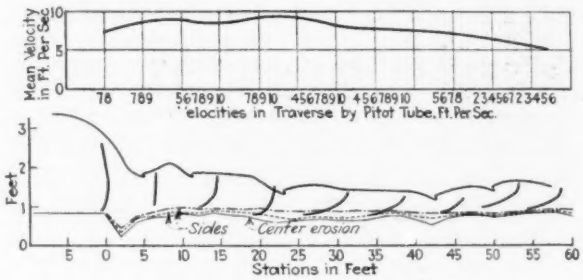
Scour—To determine scouring action, which is considered to be one of the most critical and uncertain elements, a scouring channel was built with flaring walls to produce velocities of from 2 to 14 ft. per second. Tests exceeding 50 hours were made. Profiles of the sand were plotted and Pitot tube traverses were run for velocities. The critical scouring velocity of the natural ground at the spillway was found to be $5\frac{1}{2}$ ft. per second. The soft, sandy clay underlying the clay surface scours at $2\frac{1}{2}$ ft. per second.

The same apparatus was used to determine silting, though the model scale was considered too small for accurate results. Tests, however, indicated silting at 2 ft. per second.

The best protection from scour below the structure is considered to be an adequate depth of smooth-flowing water, but when the gates are first opened this deep tailwater is not available, nor is it available in case the floodway is unusually well cleared. The alternative is



SETTLEMENT OF CONCRETE AND WOOD PILES UNDER PROGRESSIVE LOADING



SCOURING VELOCITY TEST ON SURFACE SOIL
Erosion irregular but decreases with reduction of mean velocity.

to distribute the water in a thin sheet, and this will be attempted by limiting the initial flow to about 40 sec.-ft. per linear foot. At Sacramento the weir carries about 65 sec.-ft. without unusual scour.

As worked out, the physical means of preventing damage from scour are a low-placed apron with dentated sills, a downstream cutoff wall, articulated concrete mats over riprap for toe protection, and no clearing for some distance below the structure.

Silting—In floods the Mississippi averages about 700 parts per million of silt by weight. This amount will produce 400,000 tons in one day when the spillway is operated at capacity. Low velocities in the flat sections will definitely produce silting, but methods of handling the silt problem, the engineers feel, should be determined by actual use after the project is completed. Low wing dams or a dredge cut in the center of the floodway may be found necessary.

Structural Design

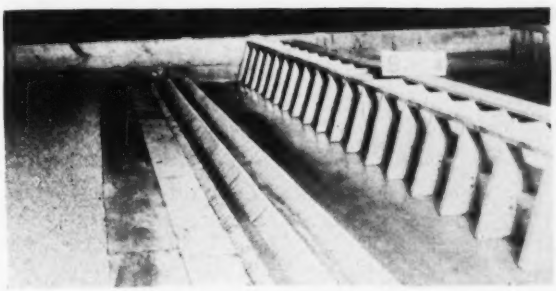
The main structure, comprising the piers, gates and the heavy slab which receives the impact of the falling water, takes up the heavy stresses and impacts. It is designed also to take up unequal settlement, an essential because of the foundation subsoil. Each pier is separated from adjoining slabs by a construction joint and the fore, or downstream, apron is divided into slabs 22 ft. wide. To insure an unbroken obstruction to percolation, copper metal is used in the construction joints and the sheet piling is embedded deeply in the concrete slabs.

Main Section—Piles support the main section. The piers take all the horizontal thrust except that from the lower end of the needles, so that the piles under the main section support mainly the concrete and superimposed water. The pile spacing and foundation design were in accordance with results from bearing tests, cohesion and sliding friction tests, and tests for the lateral resistance of piles.

About 300 test holes were sunk some 100 ft. deep to explore the underground characteristics. Fifteen wood test piles and six concrete test piles were driven on the line of the weir. Typical results from loading test piles are shown in the accompanying graph.

The sliding and cohesion tests were made by measuring the sliding resistance of heavy slabs on the ground surface. Very great reduction in both cohesion and sliding friction resulted when the water percentage was increased. These studies and the tests on pulling piles horizontally enabled the engineers to check the safety of the dam against sliding. It has a factor of safety of ten.

All types of gates were considered, including stop



ONE-TWENTIETH SCALE MODEL SET UP AS DAM WAS FINALLY DESIGNED

Three rows of dentated sills and water cushion 3 to 4½ ft. deep will dissipate energy and reduce velocity to non-scouring figure.

logs, wooden shutters, steel shutters, Stoney gates, tainter gates and needles. Needles were finally decided upon because of simplicity of action.

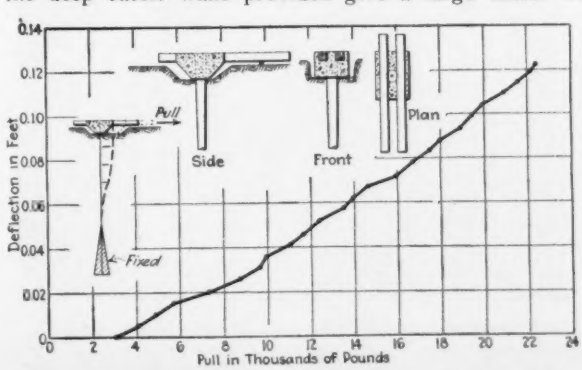
Clearances under the operating bridge are 4.5 ft., which is 1.5 ft. more than the clearance allowed the railroad bridges in the floodway. Experience in the Sacramento River project indicates that no particular harm results from floating trees.

Fore Apron—The downstream apron resists erosion of the water before the energy has been dissipated. There is an uplift under this apron as well as a horizontal pull equal to the reduction in energy caused by reducing the velocities of water along its stretch. The apron is of light design without pile support. The load of concrete and water is about 1,500 lb., which is less than the 2,500-lb. load capacity of the soil.

A water cushion 3 to 4½ ft. deep is found necessary the whole length of the spillway. Before experiments had been made it was thought possible to employ two cross-sections. One with a stilling pool was to be used to furnish the remaining non-pool section with backwater in which the "rollers" from the sills would be built up to dissipate the energy. The test models showed that this was not practicable.

Cutoff Walls—Steel sheet-piles, 45 and 25 ft. long respectively for upstream and downstream cutoff walls, prevent undercutting of the dam in case of scour. For a short section near the center where there is a thin sand stratum well under the surface the pile length is increased to 55 ft.

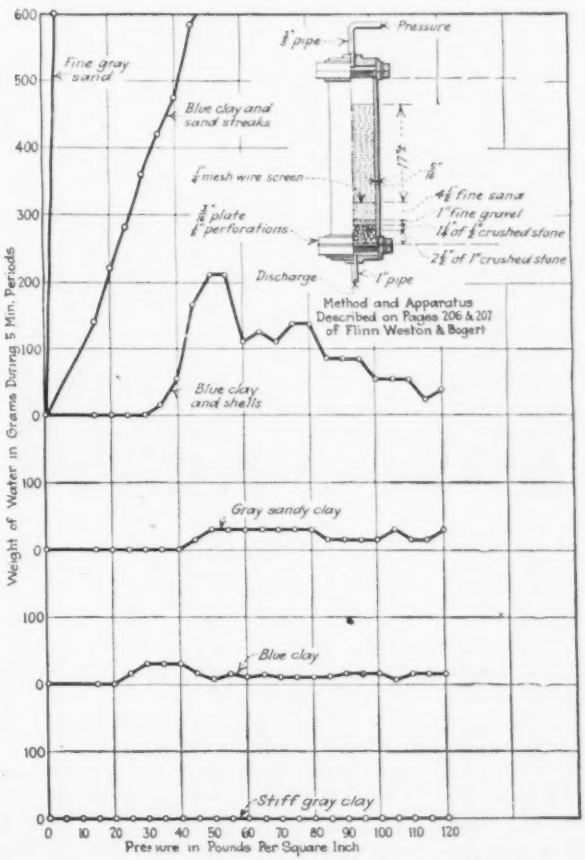
The entire area is covered with an unusually impervious stratum of clay 15 to 40 ft. deep. Tests indicate that a 6-in. section of this material, if confined, will resist a 50-ft. head of water without carrying material through. It is felt that unusual precautions are being taken against failure due to direct "piping" action, as the deep cutoff walls provided give a large factor of safety. Many dams of equal head built on pervious soils have cutoff walls only 15 to 18 ft. deep, being designed in accordance with Bligh's formula.



RESISTANCE TO LATERAL THRUST BY WOOD PILE

Riprap Protection—From the experiments made it is believed the mean velocity at the end of the fore apron can be kept down to 5 ft. per second by the dentated sills and water cushion—that is, for the project discharge. Higher velocities will be encountered and tests were made up to 10 ft. per second. By proper operation of the needles the velocities may be kept well within the limits of scour.

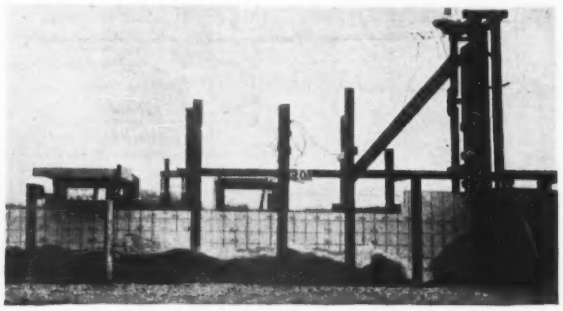
Experiments on toe protection devices included different sizes of riprap, concrete blocks and flexible concrete mats held together by wire reinforcement. These flexible mats were generally similar to the articulated slabs used for Mississippi River bank revetment. Except where underlain by riprap, flexible mats tried at many other dams have failed. The experimental work here developed the fact that the mats must have sufficient extensibility to follow the scouring line. This was effected by looping the connecting-wire reinforcing. The underlying rock must be large enough so that it cannot be washed out between the ends and sides of the blocks. There is a suction pull acting on the underlying material, and the remedy to prevent removal is to provide an upside-down filter underdrain system in which the riprap is graded. The edges of the blocks are beveled so that the water will be thrown upward rather than underneath the blocks. Square edges were found to deflect water downward through the cracks and thence along the underside of a block to another crack, from which the water issued, carrying material.



RESULTS OF PERMEABILITY TESTS OF SOILS

In the final designs the blocks are 3 ft. square and 6 in. thick and are reinforced by copper-bearing steel wire looped to give a 5-in. extensibility, which the experiment indicated might be expected. It will permit the slabs to drop into an eroded hole 4 ft. deep and 25 ft. long. Should scour occur near the structure, the articulated blocks are here tied together and to the structure with heavier rods than the remainder so that the mat will hang below the toe of the dam. Holes are provided for new ties in the blocks should the reinforcing give way in the course of time. The blocks are tied to the apron by a ladder rod so as to permit a vertical drop of 18 in.

Floodway and Guide Levees—The entrance to the floodway at the river is over the natural deposit of silt built up by the river before levees were constructed. The ground elevation at the river is 14 ft., sloping away to almost Gulf level in the swamps within a mile. Backwater in the discharge channel will build up depending on the condition of clearing; under the worst condition



MODEL FLUME FOR TESTING BAFFLE AND CUSHION DESIGN, BONNET CARRÉ SPILLWAY

The near side is glass, permitting a view of water action which can be photographed against the scale on the far side of the flume.

it will reach the river level. The elevation of the side levees has been set 1 ft. above the worst condition and 3 ft. above the normal expected. In the cleared section near the weir n was taken as 0.05; in the swamp section at its worst, 0.17.

To prevent scour of the levees by high velocities in the borrowpits a 900-ft. batture is provided between the toe of the levee and the pits. Dry-land methods of levee construction are to be used on the higher ground near the river, the section to be like the river levees. In the swamp hydraulic methods are indicated to build up a supporting base 200 to 300 ft. wide and 10 ft. high; after this base has dried out the superimposed fill will be thrown up.

Personnel—The Bonnet Carré spillway is under the general supervision of W. H. Holcombe, Major, Corps of Engineers, U. S. Army, district engineer in charge of the New Orleans River District. Major E. S. J. Irvine is chief of the Bonnet Carré spillway section and has direct charge of research, tests and design, with Capt. Helmer Swenholt in charge in the field. Final revision of the design was made in the office of the Chief of Engineers at Washington. The civilian engineers include Prof. W. B. Gregory, consultant on hydraulics, and J. F. Coleman, consultant on foundations. The regularly employed civilians on this work were R. B. McWhorter, senior engineer, and I. A. Winter, senior hydraulic engineer, and on early designs, C. A. D. Young, associate engineer, and H. A. Boath, assistant engineer.

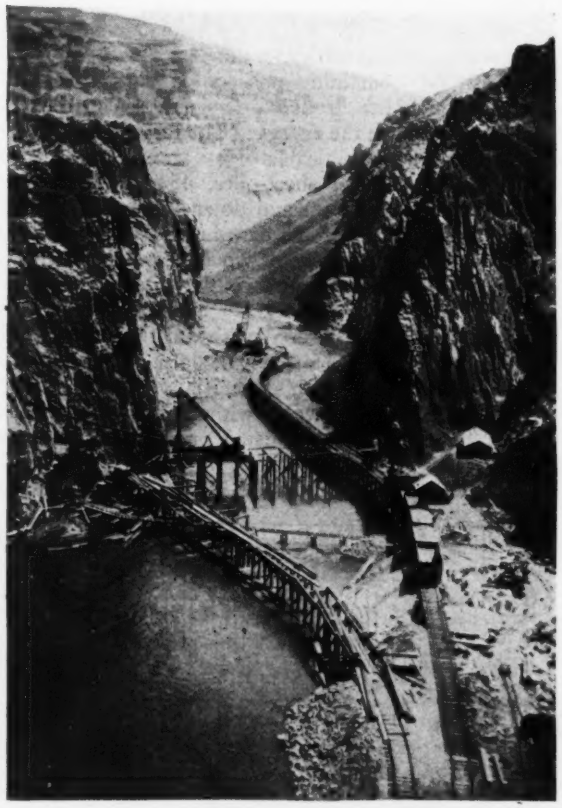
Construction Progress on Dam for Owyhee Irrigation Project

Foundation for 522-Ft. Structure to Be Unwatered This Summer—Diversion Tunnel Driven—Concrete Handled in 8-Yd. Buckets

PROGRESS on the river diversion structures of the Owyhee dam, 522 ft. high, which is to store water for the Owyhee irrigation project in eastern Oregon, indicates that the dam foundation site can be unwatered in August. The dam will have a semi-gravity section, arched in plan, and is to contain 525,000 cu.yd. of concrete. The contract calls for completion March 3, 1933. The design and general features of the structure were described in *Engineering News-Record*, April 26, 1928, p. 663. The following is a review of progress as noted by a member of *Engineering News-Record* staff who visited the work recently.

In order to expedite the project as a whole, the contractor started the diversion tunnel on July 14, 1928, with equipment brought in on motor trucks. Since then a standard-gage railroad, 24.3 miles long, has been built connecting the site with the Union Pacific Railroad at Dunaway, 5 miles south of Nyssa, Ore. An excellent camp was developed about ¾ mile below the site and work was begun installing construction plant and stripping the dam site.

The diversion tunnel on the right bank is about 1,000 ft. long, circular in section and 22.6 ft. in diameter inside the concrete lining. The tunnel was holed through



LOOKING UPSTREAM AT OWYHEE DAM SITE

Diversion tunnel outlet at left. The two draglines are approximately on the dam site. Talus at the left of the draglines is the result of stripping operations.

Oct. 6, 1928. The lining was put in because the greater part of the tunnel will serve as a permanent outlet for the circular spillway which is to discharge into the tunnel through a shaft, and because lining would increase the size of the maximum flood that could be bypassed. Under a head of 75 ft. the tunnel is designed to pass 18,000 sec.-ft., which with the storage created will handle the maximum recorded flood. The tunnel lining is to be completed some time in August.

LOOKING DOWNSTREAM ACROSS OWYHEE DAM SITE
Diversion tunnel intake at right. At left the stripped area on canyon wall marks the left abutment. Upper cofferdam will be near the end of the muck pile in the channel.

The canyon at the dam site is only about 300 ft. wide at streambed level, and the depth from streambed to bedrock is 50 to 60 ft. The diversion dam is to consist of a three-ply membrane of 2-in. planks carried down to bedrock and there bedded in concrete in a trench. The planks will be driven vertically and joints will be broken. On either side of the plank membrane a rockfill with 2:1 slopes is to be carried up to a height of 80 ft. above streambed and will be made 30 ft. wide on the crest.

The backwater dam, just above the diversion tunnel outlet, is to consist of two parts, one being a training wall of rockfill and steel sheet piling to divert the current, and the second a watertight bulkhead nearer to the dam to be built of steel sheet piling. All the fills are being made from tunnel muck or with material stripped from the dam foundation. Practically all this material is the hard felsite which constitutes the canyon formation.

If these diversion works can handle the floodwaters of next spring, it is believed that during the ensuing year the foundation can be poured and carried up to a height such that the floodwaters of the following spring will not constitute a menace.

A feature of the foundation work is the fault in the rock formation which traverses the canyon lengthwise at the site. This fault is 10 to 15 ft. wide and core-drill explorations indicate that because of it the foundation excavation will have to be about 15x250 ft. at a level 520 ft. below the crest of the dam. Below this fractured zone in the felsite is pitchstone agglomerate and tuff, which, on account of its greater elasticity, is expected to be but slightly affected by the small displacement of the fault.

Work is now in progress erecting the overhead cableway of 1,306-ft. span across the canyon at the dam site. The main cable is 3 in. and is designed to carry 25-ton loads. This cableway is to be used chiefly for placing concrete, which will be handled in 8-cu.yd. buckets. So that the delivery system may cover the entire arc of the dam, one end of the cableway is attached to a mobile headtower operating on a track 475 ft. long laid transversely to the span. All movements of the cableway loads and of the headtower will be controlled by an operator close to the point where concrete is being deposited and will be remotely controlled by electric switches.

Concrete is to be delivered to the cableway bucket by standard-gage trains of two 4-cu.yd. cars, each car carrying a batch from one of the two 4-cu.yd. mixers. The layout provides for placing 1,000 cu.yd. of concrete in an eight-hour shift. Three shifts will be worked.

The General Construction Company, of Seattle, has the contract for the Owyhee dam, the amount bid being $3,200,000 exclusive of cement, steel and steel structures, which are furnished by the U. S. Bureau of Reclamation. J. A. McEachern is president of the General Construction Company, J. W. Lawlor is vice-president and general manager and V. G. Hindmarsh is superintendent at the dam. The work as a whole is under the supervision of F. A. Banks, construction engineer, U. S. Bureau of Reclamation, Owyhee project, with F. Schlapkohl field engineer and C. A. Betts office engineer.

Water-Power Resources of McKenzie River Basin, Oregon

The water-power resources of the McKenzie River basin amount to 442,000 hp. for 50 per cent of the time and 289,000 hp. for 90 per cent of the time, according to Benjamin E. Jones, hydraulic engineer, and Harold T. Stearns, geologist, of the U. S. Geological Survey. The developed power consists of the Eugene municipal plant of 4,300 hp. A second plant, near Leaburg, which is being built by the city of Eugene, is nearing completion and will have an initial capacity of 10,000 hp. and an ultimate capacity of 20,000. It is estimated that if all the sites in the McKenzie River basin were developed and interconnected with a large power system, with steam stand-by to carry the load in dry seasons, the total usable power would equal twice the present requirements of the State of Oregon. Electrochemical, electrometallurgical or other industries requiring large amounts of power offer the only possibility for early development of these great resources. Mr. Jones and Mr. Stearns have prepared a manuscript report that includes 71 pages of text, seven sheets of maps showing plan and profile of the main stream and parts of the principal tributaries, and numerous tables, diagrams and photographs. This report can be consulted in the branch office of the Geological Survey, Post Office Building, Portland, Ore., or at the main office in Washington, D. C.

Progress and Overtime Balanced to Speed Building Schedule

Seven-Story Factory Completed in 90 Days by Close Follow-Up on Deliveries and Balancing Value of Speed Gained Against Extra Charge for Overtime Work

By John G. Ahlers
Barney-Ahlers Construction Corporation, New York, N. Y.

Equating the worth of earlier completion and the extra wages, overtime work was made a valuable contributing factor in the quick construction of the factory described in this article. Ordinarily in construction operations both owner and contractor grudgingly accept overtime work. In the operation described it was courted as a definite economic agency. The cost of overtime and the value of what it accomplished were balanced and if the gain exceeded the outlay overtime was employed. The result was excellent and it makes this article one of the most suggestive accounts that has recently been laid before contractors of a building operation of moderate size. —Editor.

A SUGGESTIVE example of judiciously incurring overtime labor charges to speed up both deliveries of materials and work in the field so that a new factory could get under production on pressing orders is furnished by the construction of the Charles Pfizer Company Building in Brooklyn, New York City. Charting a performance schedule figured to the day when the factory had to be in the owner's hands, a struggle was begun to gain on this schedule, first, to secure a fund of saved time to meet emergencies, and second, to make earlier delivery of the finished factory. In this task the contractors worked closely with the owners, every step of extra expenditure to gain time being made by mutual agreement. It is believed that the operation furnishes an illustration of full co-operation and exact co-ordination in construction which is worth examination.

In setting down the account of ways and means a narrative form has seemed preferable. With so many operations and considerations closely interlocking, any organization of the article according to classes of work is confusing.

Quick Preparation for Contract

In September, 1928, the Charles Pfizer Company had plans under way for a new factory, had cleared a site and had awarded a contract to the Raymond Concrete Pile Company for a concrete pile foundation. Toward the end of the month orders for goods based on delivery by Jan. 15 had piled up so that the owners were driven to have the new factory in operation not later than the first week in January.

On Thursday, Sept. 22, the writer's firm was called in to outline what it could do. As the plans of the structure were not finished, only a word picture of what might be done could be presented. There was naturally reluctance on the part of the owners to award any contract or to commit themselves to any program without a knowledge of the cost. On being told that plans would be available by 4:30 p.m. on Friday, the contractors promised to have their estimating department work all night and be ready with a guaranteed cost on Saturday morning. In a conference on Saturday the contractors presented the graphic speed schedule shown in Fig. 1, submitted a guaranteed estimate and had their superintendent tell in person how the work would be handled. These combined assurances led to an order to proceed so that action might be taken at once and have the job get under way on Monday, Sept. 26. Over Sunday the contractor's superintendent, his carpenter foreman and others prepared form lists, plant layout and lists of tools and supplies, and Monday found the job a going project.

Pushing Foundations and Steelwork

At this time the piledriving contractor had a program calling for completion on Oct. 15. It was shown on the speed schedule that occupancy was hinged on each step of the operation from driving the piles to pouring the

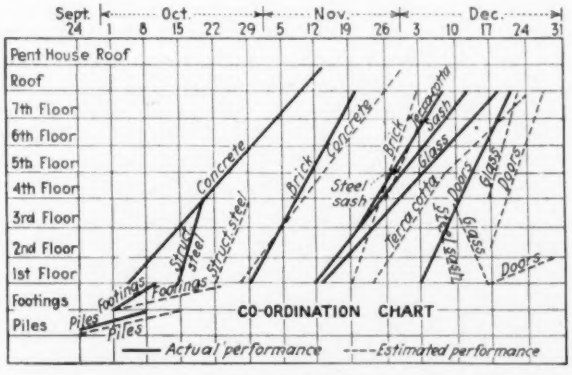


FIG. 1—PLANNED AND ACCOMPLISHED PERFORMANCE SCHEDULE

Note the time gained largely by advancing through overtime work the key operations of foundations, steel column erection and concreting.

roof. Even though steel cores were required for the columns of the lower four floors and delivery of these was the key operation, it was plain that piledriving had to be speeded up to be ready with footings and first floor in time for setting the columns.

Fortunately the owners had arranged with the piledriving contractor to work overtime if required; pressure was put on the driving crew and the date of completion was advanced one week. This was shown to be good judgment, for within six days the concrete gang was pouring footings immediately back of the driving rig. This was Oct. 1, and arrangements were made for the pile crew to work overtime during the following Saturday and Sunday, and the last footing was poured Oct. 8, immediately after the piledriver was rolled out into the street to be taken away.

The building was designed for a heavy loading of

200 lb. per sq.ft., therefore structural-steel column cores were required for the first four floors. On Sept. 26 these steel cores were neither detailed nor ordered. On that date the contractors called in Levering & Garrigues and gave them a contract without competition on their promise of delivery in four weeks, or on Oct. 22. They worked into the night of the same day on plans and the following morning had details ready for approval. These were checked and returned the same day, while material which was not in stock was ordered, so that assembling and fabrication could start while the job forces were getting on with the foundations.

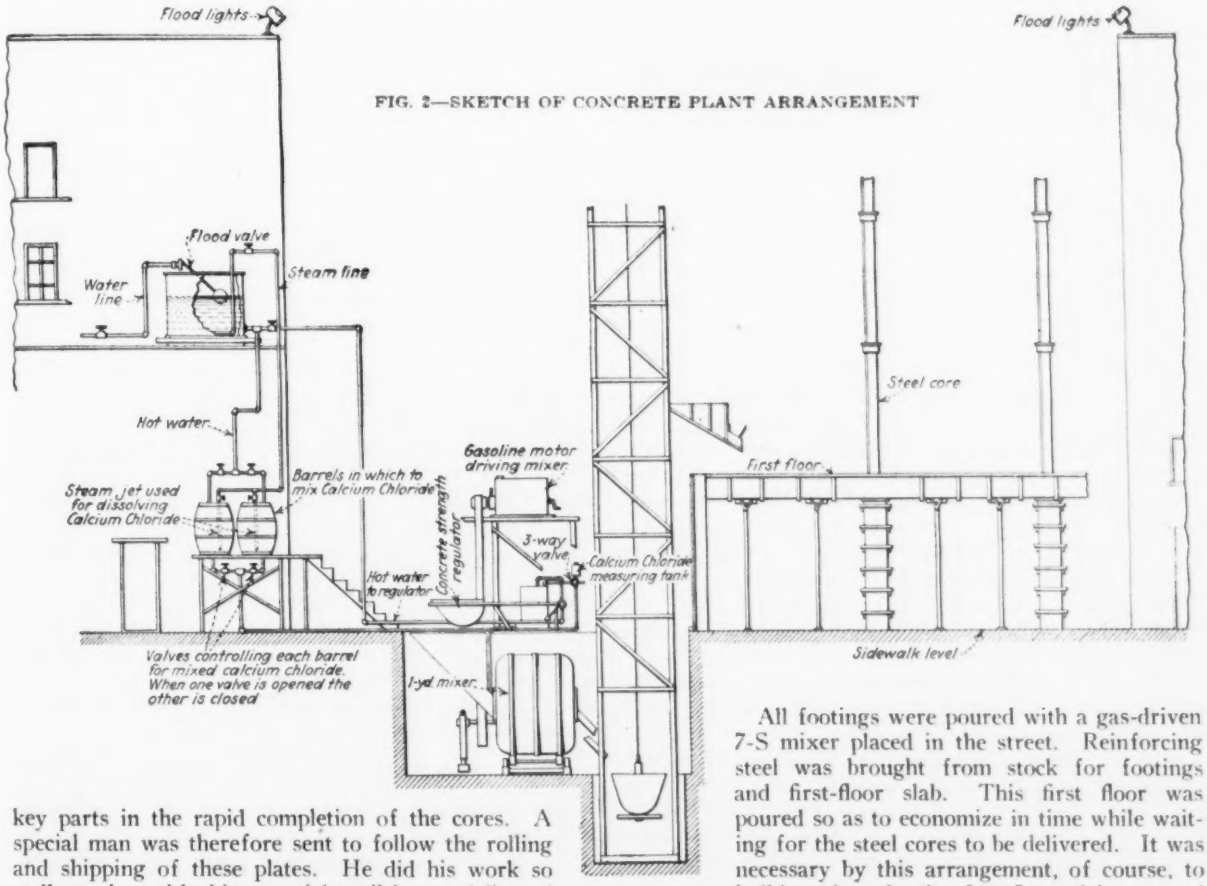
On checking up it was found that certain steel plates had to come from Coatesville, Pa., and that these were key parts in the rapid completion of the cores. A special man was therefore sent to follow the rolling and shipping of these plates. He did his work so well, staying with this material until it was delivered at the steel contractor's shop, that three days were cut from the speed schedule.

The system of balancing progress against expense was here begun. It was reported that by spending $250 on overtime two days earlier delivery could be arranged. This action was authorized and carried out. The owners had spent $573 on overtime for the piledriver; the two operations were thus co-ordinated and it worked out perfectly in the field, for the last footing was poured on Oct. 8, with the first self-supporting floor on top of it on Oct. 11. Oct. 12 was a holiday. The first floor set up and was hard enough to allow unloading of billets on Monday, Oct. 15.

The derrick for erection was delivered on Oct. 13, was set up and was ready to work on Oct. 15; this was seven days ahead of the original schedule. The excess cost to this point was $823 and one week's time was gained. By working overtime erecting steel columns at a cost of $226, an additional day was gained, and all structural steel was in place Oct. 20, nine days ahead of projected time.

While fabricating the steel and pouring the foundations were under way a very careful study was made of the plant requirements for the concrete work. To get a large concrete output it was decided to put in an oversize plant, so a 1-yd. mixer was selected. This mixer was set in a deep concrete pit to keep out groundwater and to bring the charging hopper level with grade, making it possible to dump aggregates directly from the trucks in front of the mixer and charge it without elevating the dry materials. This plant layout (Fig. 2) was drawn up to the last detail.

FIG. 2—SKETCH OF CONCRETE PLANT ARRANGEMENT



All footings were poured with a gas-driven 7-S mixer placed in the street. Reinforcing steel was brought from stock for footings and first-floor slab. This first floor was poured so as to economize in time while waiting for the steel cores to be delivered. It was necessary by this arrangement, of course, to build pockets in the first-floor slab recessed to the tops of the footings, where anchor bolts were provided for the steel billets. The pockets were built with sloping sides and large enough to enable the steel workers to shim up and level the steel. After the columns were plumbed and braced the pockets were filled with concrete.

While the first floor was being poured form lumber was purchased from stock, it having been found by analysis that even though stock lumber would cost more, the certainty of delivery and elimination of rehandling would partly offset the paper saving shown if lumber were bought from the mill. A complete form fabrication shop was arranged in one of the owner's sheds in which the two sets of forms contemplated in the original estimate were made ready several days before erection.

On Oct. 9 the first forms were set up for exterior columns, as in these no steel cores were required. The Kalman Steel Company, which furnished the reinforcing bars, speeded up its delivery and co-operated to the

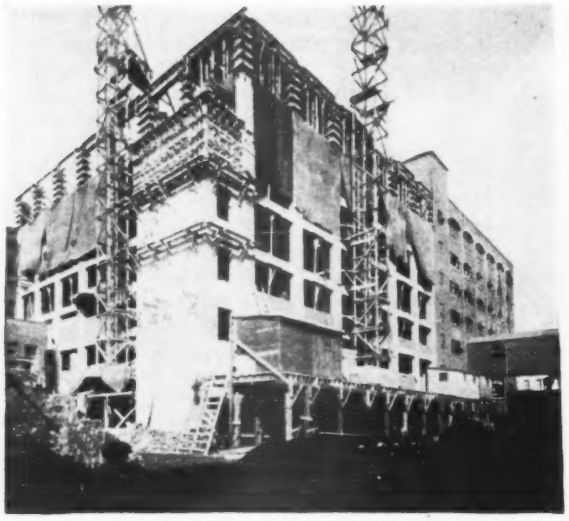


FIG. 3—BUILDING WITH THE CONCRETING APPROACHING COMPLETION
Work completed and time elapsed shown on progress chart, Fig. 1

extent of delivering materials from one week to ten days earlier than originally expected. Oct. 21, the day following the completion of the steel cores, the first section of the second floor was concreted, and it now became a race with time to beat the original schedule still more.

In the beginning a substantial amount had been set aside for overtime work; the owners nevertheless were kept constantly informed as to progress and cost, and it was found that by authorizing additional overtime, the original schedule on the concrete structure could be improved considerably. A weekly estimate of overtime was therefore given in advance and the amount of time saved by the spending of this money estimated. Under this procedure, with the two sets of forms, the entire seven floors and roof were concreted between Oct. 21 and Nov. 12.

There was constant control of the concrete by using a water-cement ratio control device, and from each day's pour samples were taken and cylinders made, with the test results reported to the job at three-day, seven-day and 28-day periods. The average strength of the concrete throughout the structure was 2,660 lb. at 28 days. The average strength at three days was 1,200 lb. and the average strength at seven days was 1,925 lb. This was secured by using a water-cement ratio of 0.90. The cement factor per yard of concrete was 1.51. There was 2 per cent (by weight of cement) of calcium chloride added to all concrete in the form of a concentrated solution made in barrels on the job and fed by gravity to the concrete strength regulator as shown on the plant layout (Fig. 2). The concentrated solution was incorporated in the water-cement ratio balancing device and not added to the amount of water used for the proper water-cement ratio.

Live steam used in the water reservoir made concrete go into the forms at an average of 70 to 80 deg., the job was inclosed with canvas to protect the concrete against any sudden cold snap in the weather and salamanders were used on the last few floors. The high strength developed made it possible to remove the forms in 56 to 72 hours after the concrete was poured. Two- and three-day strength tests were always reported by telephone to the job. Column forms were removed within 24 hours and with two sets of forms the job could go ahead with absolute safety and at high speed.

Taking advantage of the adjacent high buildings, large floor lights were built permanently on the roofs of these, which made it as bright as day whenever work was carried on after sunset. Fine co-operation was developed among all the trades on the work. The job was laid out so that carpenters expedited the work and gave the metal lathers and electricians as much time as possible to place reinforcing and electrical conduits. Plumbers and steamfitters followed closely to place inserts and sleeves, and the concrete gang was pouring concrete right up to and almost on top of the other trades working on the forms. It was a constant race to keep out of one another's way.

Expediting Minor Operations

There were many items requiring special follow-up in this job—for instance, the white glazed partition tile. These glazed terra cotta tile were a new product and had not been sold in quantity before. There was some uncertainty of production, and the job was therefore scheduled so that a change might be made from white glazed tile to common tile.

Bricklayers started erecting the exterior walls (with white glazed brick for inside facing) on Oct. 29 and followed up the structural work as closely as possible. The order for the white glazed partition tile was placed Oct. 8 and the first delivery date promised was Nov. 19; the first tile actually arrived at the job on Nov. 19 and partitions were started promptly.

Four of the floors in this building were a honeycomb of individual rooms containing waterproofing, asphalt floors, concrete fill, steel framing, etc., to be built into the factory before the owners could take possession and install machinery. All this was scheduled, traced, delivered and erected so that the owners' installation of equipment started early in November.

Every subcontractor caught the spirit of the job and made it a game to be on time and not be the one to be blamed for delays. This co-operation and the attempt to be on time permitted the owners to install equipment and machinery so that the building was ready for manufacture on Monday, Dec. 17.

Discussion of Speed-Up Methods

The success of the entire operation was due in no small measure to the weekly meetings held in the owners' office. Here at one table were seated the officers of the owners ready to make immediate decision; engineers to answer all problems of design, installations, changes and permits; officers of the contractors to report and outline the following week's costs and progress; the purchasing department head to receive approval on letting of all orders and subcontracts; the superintendent in charge of field work to answer all questions and make requests, and the expediter to report on and receive assignments for the work. Rarely was any one found wanting at these meetings and the very fear of facing such an assembly with excuses was enough at times to accomplish the impossible. Promises made at such conferences had to be faced one week later, and no excuses were accepted.

The accompanying progress chart (Fig. 1) is self-explanatory. It should be noted that the bettering of the original schedule was accomplished through concentration on the key items at the very early part of the job. For instance, had not the piledriving contractor speeded

up, enabling construction of footings and foundations for steel cores, it would have been of no avail to speed up the fabrication and delivery of later items.

It also should be noted that had tile, brick, steel door-frames, steel framework and other interior equipment not been scheduled and delivered on time, the early completion of the framework and inclosures would have been useless. An illustration of this is seen in the steel sash. A special type of galvanized sash was required by the owners. As it took some time to find the proper kind, the order could not be placed until Oct. 11 and the best possible date of delivery obtainable was Nov. 23. By sending an expediter to the plant it was possible to make shipment four days earlier, so that sash was delivered on the job on Monday, Nov. 19. All plans had been made in advance, a gang of erectors was on the job and sash was placed the same day, sills were poured in the afternoon of the same day and the glazing was begun within 48 hours after the sash was delivered on the job. The building thus became inclosed, comfortable and suitable for the installation of the owners' equipment.

Summary of Overtime

The total extra cost of overtime and other incidental items, summarizing the figures given above, amounted to $8,388. This sum may seem large, but it is offset by the owners' use of the building not less than 30 days earlier than contemplated, and by saving an unexpended amount of winter-weather protection had the structure been built in December and January, as would have been the case under the original program. The additional cost of an extra set of forms amounted to $4,225. The saving of six weeks' overhead on the job (amounting to $800 per week for supervision and foremen and $350 per week for plant rental) might be estimated at $6,900.

Hydraulic Formulas Incorrect for Partly Filled Pipes

Experimental Data Show That Full Flow Produces Higher Velocity Than Half-Depth Flow

By Charles W. Sherman
Of Metcalf & Eddy, Engineers, Boston, Mass.

ACTUAL measurements of flow of water in pipes show that none of the standard formulas is correctly applicable to a closed conduit partly filled, in which the width of water surface diminishes as the depth of water increases.

The formulas in use all include the hydraulic mean radius R, the slope S and a coefficient which is supposed to include the effect of roughness of the surface of the conduit or channel. This type of formula is mathematically logical if the effect of friction may be taken as a definite and constant function of the average velocity in the cross-section and if the extent of surface in contact with the air be assumed as of no consequence. It was recognized many years ago, however, that the application of such a formula gave distinctly incorrect results in certain cases. In particular, the case of a river which was above its banks was known as one in which the computation should be made in two parts, one applying to the comparatively narrow and deep channel, the other to the wide and shallow section above the overflowed land.

In spite of this recognition of the fact that the formulas are not of universal application, they have continued to be used for computation of flow in circular and other closed conduits partly filled, with little or no question of their applicability. In fact, it is commonly stated, even in works on hydraulics, that in a circular conduit the mean velocity when the conduit is half filled is the same as when it is full; and probably many engineers have come to believe that this statement is as true as the law of gravitation. Some may even look upon any questioning of the statement as rank heresy. Nevertheless, it is not true in the majority of cases.

In what follows, the Kutter formula will be utilized as typical, but similar statements would be applicable if the Manning, the Hazen and Williams, the Chezy or any other standard formula were employed.

Comparatively few experiments have been made upon flow of water at various depths in closed conduits, and the available data are not entirely consistent. They are sufficient, however, to show that the computation of flow under such conditions by Kutter's formula is unsatisfactory.

Scobey and Ramser Tests—Fig. 1 shows the results of experiments on flow in 42-in. and 36-in. concrete pipes, reported by Scobey (Bull. 853, U. S. Dept. Agric.). It is seen that the average velocities in pipes half full were materially less than those which would have been obtained with the pipes full, although in only one case

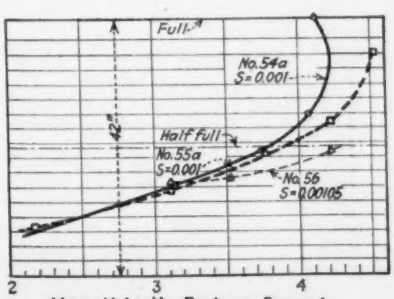
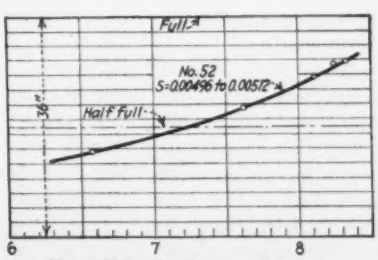


FIG. 1—SCOBEY'S TEST RESULTS ON CONCRETE PIPE



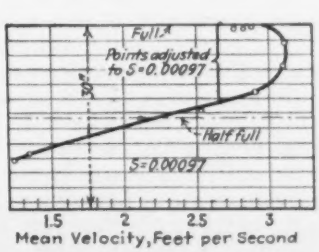


FIG. 2—RAMSER'S DRAIN TILE TESTS

was the pipe actually filled. The difference between the average velocity when half full and the probable velocity when full was very much more in the case of the 36-in. pipe when the slope was steep and the velocity high than for the 42-in. pipe. It is obvious that the change in average velocities with depth is not what would be obtained from Kutter's formula.

Experiments on flow in a 30-in. drain tile reported by Ramser (*Proc.*, Iowa Eng. Soc. January, 1921) show similar results as indicated by Fig. 2.

Wilcox Results—The foregoing experiments, although definite in their indications, do not provide as complete a test of the applicability of the formula as is desirable, because made on conduits laid to definite slopes and therefore giving no comparison of the flows in the same conduit at various slopes. The only available data of such experiments in which the slopes were varied are those obtained by Yarnell and Woodward upon drain tile 4 in. to 12 in. in diameter (Bull. 854, U. S. Dept. Agric.) and by Wilcox upon 8-in. sewer pipe (Bull. 27, Eng. Expt. Sta. Univ. of Wash., 1924). While the former covered several sizes of pipe, the latter are more instructive because of the greater range of slopes employed—0.005 to 0.040, as compared with 0.0005 to 0.015 in the Yarnell and Woodward experiments. The results of the tests are generally similar in their indications. In both sets of experiments vitrified as well as cement pipes were used.

Fig. 3 shows the significant results of the Wilcox experiments on vitrified pipe, the heavy curves representing the average velocity corresponding to any depth for the slope indicated. For each slope, a curve showing the value of mean velocity according to Kutter's formula has been drawn as well, based upon such a value of n as will make the curves approximate those of the experiments. It is seen that only in one case—slope 0.005—does the curve of actual mean velocities agree closely with that representing the formula, and this was for a low value of n (0.010). With increasing slope and higher velocities it was necessary to use greater values of n to obtain curves which would approximate the actual mean velocities through a reasonable range of depths, although the values of n corresponding to the actual mean velocities for full pipe were substantially constant.

COMPUTED VALUES OF n FOR WILCOX TESTS

Slope S	¼ Full	½ Full	Full
0.005	0.0098	0.0104	0.0095
0.010	0.0102	0.0108	0.0093
0.020	0.0110	0.0115	0.0089
0.030	0.0123	0.0121	0.0092
0.040	0.0127	0.0126	0.0093

Apparent Variation of n—Since it is possible to compute the value of n corresponding to any observed values of V and S, the disagreement between actual velocities and those computed by the formula would not be detected from tests of flow under a single condition. It is significant to note the values of n corresponding to the observed velocities and slopes in the Wilcox experiments in vitrified pipe, as they are given in the accompanying table.

This shows that for a full pipe, when every part of the perimeter of the stream of water is in contact with the pipe, n is nearly constant and, as far as this test shows, Kutter's formula may be considered satisfactory. For anything less than a full pipe, however, n varies both with depth and with slope, although it is nearly constant for all depths in the case of the very flat slope.

Although the standard formulas are based upon the assumption that friction between the free surface of the water and the air above it is negligible, this is not always the case. It is logical to believe that if a current of air moved against the flow of water, the friction might be considerable, while it would be slight if both currents were in the same direction. In none of the experiments quoted above was there any observation of the air currents, or at least no information has been reported. It would obviously be difficult to include in a satisfactory formula a term for the effect of friction of the supernatant air.

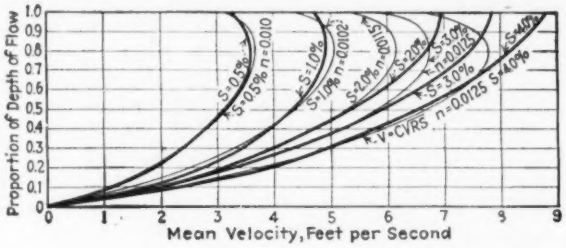


FIG. 3—RESULTS OF WILCOX WITH VARIOUS SLOPES, 8-IN. SEWER PIPE

Heavy curves give average measured velocities. Light curves give results of Kutter formula with values of n chosen to fit measured results.

Conclusion—The writer regrets that, having shown the weakness of the commonly used formulas, he is unable to suggest a new one which would be more satisfactory. He has grave doubts whether the data now available are sufficient to enable a suitable formula to be devised.

It seems probable that computations by Kutter's formula, using such values of n as are commonly employed in designing sewers, will produce as nearly correct results as can be obtained by any method now available; and that the capacity of closed circular conduits when full will be somewhat greater than that obtained by the formula with the same value of n. No serious error in design is likely to result from this practice. It should be recognized, however, that it is not accurate, but merely a makeshift, allowable because no better method is known; and that the inaccuracies are so great that computation of discharge from measured depths and slopes should not be attempted.

Street Railway Strikes Analyzed

Since 1919 there have been 214 strikes on street railway properties, according to the Department of Labor. Of this number only eighteen occurred in the last five years. The table summarizes the results.

NUMBER AND RESULTS OF RAILROAD STRIKES IN THE UNITED STATES FOR THE ELEVEN YEARS 1919–1929

Year	Number of Strikes	Results Were: Favorable to Employers	Favorable to Employees	Compromised	Undetermined
1919	75	11	20	25	19
1920	59	10	10	23	16
1921	11	2	1	6	2
1922	18	5	5	4	4
1923	20	11	1	5	3
1924	13	2	6	3	2
1925	5	2	3	..	..
1926	7	5	..	1	1
1927	2	..	1	..	1
1928	3	1	1	1	..
1929	1	..	..	..	1*

*Not settled.

Sanitary Engineering in the Carolina Piedmont

Progress of Sanitation in the South, With Special Reference to Water and Sewage Treatment and High Residual Typhoid in Some Parts—Work of State Sanitary Engineers of North Carolina—Sewage Treatment, Mill Villages and Industrial Wastes in the Piedmont Region of the Carolinas

FROM AN EDITORIAL OBSERVER'S NOTEBOOK

PROGRESS in the South is nowhere more in evidence than in sanitation, notably in water supply and sewage disposal. In these fields the prosperity and growth of the city on the one hand and the activities of state boards of health on the other are working many changes for the better. If improved sanitation is not reflected so markedly in the typhoid death rate as might be expected, it may be due to residual typhoid—typhoid that persists after the public water supply has been made safe. This theory is supported by the fact that where typhoid rates are reported separately for the white and the colored population those for the latter are so much higher than the former that they account for a large part of the high total. It should be remembered, however, that throughout the South the typhoid rate among the whites is higher than the average in other parts of the country. This suggests that sufficient attack has not yet been made on the residual typhoid among either the colored or the white population of the South.

Water Supply and Sewage Disposal in the South

Such decline in typhoid as has occurred is due to improved water supply rather than better means of sewage disposal—just what might be expected by those who realize the greater part taken by water supply in cutting down the typhoid rate. But provision of sewage-removal facilities, associated with abolition of privies or their improvement and the consequent reduction of the typhoid fly, has contributed materially to the reduction of typhoid throughout the South. Much to the same end has been accomplished not only by providing a constantly increasing number of water-purification plants but also and very markedly by putting these in the hands of trained operators. More specific mention of some of these improvements will be made later in connection with remarks on North Carolina.

Some years ago state boards of health centered their attention on sewage rather than on water treatment. Few recognized that of the two water treatment is far more important. This fact seems to have received recognition in Virginia, where sewage treatment is far less common than water purification. At the conference in Richmond last April which consummated the formation of an association of water and sewage plant operators, nearly all the program was devoted to water rather than to sewage treatment because as yet sewage-works are few and far between. This is not wholly due to backwardness. It results largely from opportunities for sewage disposal by dilution with little or no treatment, strongly demanded under present conditions.

A notable fact as regards water purification in Virginia brought out at the Richmond conference (see *Engineering News-Record*, May 2, 1929, p. 724) was the variety in the quality of the water before treatment and the corresponding variety in method employed. This is also true in other Southern states ranging in location of cities and of sources of supply from coastal plain to mountain areas. High color in the low flat regions, possible color and turbidity from drainage areas at higher elevations and relatively clear and very clear waters from high mountain areas account for these differences in the natural waters and in the methods of treatment which they require. These varying qualities of the waters also give opportunity for large-scale experiment, especially in the application of chlorine at different stages of the water-treatment process.

State Sanitary Enginering in North Carolina

In the remainder of these notes chief attention will be paid to North Carolina, and particularly to the work of the bureau of engineering and inspection of its state Board of Health. There will also be included some observations made during a visit to a few of the cities and mill villages in the thriving Piedmont section of both Carolinas.

A unique feature of the writer's visit to North Carolina was sitting in at a staff conference held by H. E. Miller, engineer of the bureau of engineering and inspection of the North Carolina Board of Health. This conference was preliminary to the beginning of active field work for the year. Each division head and some of the subdivision heads were called upon to outline their problems and how they proposed to tackle them in 1929. This is not the place to summarize the conference proceedings, but something may be said as to the wide range of work now in charge of the bureau named—all of which is being carried on with a high degree of intelligence and with a lofty spirit of public service.

In the early days of the bureau, which are not many years back, a state-wide attack was made to remedy the deplorable condition resulting from many thousands of unsanitary privies or lack of any privies whatever in large sections of the state, and particularly in rural districts. This work was carried on under the North Carolina sanitary privy law. Five standard forms of privies were adopted and inspectors were put into the field to see that these requirements were carried out in cities, villages and mill villages alike where sewers were not available. Many thousands of the sanitary privies have been built through the length and breadth of North Carolina. It is impossible to measure in terms of vital statistics how many lives have been saved by this work, but probably they run into thousands, for they have cut down other mortality than typhoid.

Perhaps next in importance is the work done on public water supplies. Through the efforts of the

bureau, combined with the growing realization of the importance of safe water supplies and the growing ability of the municipalities to provide them, the building of water-treatment plants has been stimulated. The good work has not stopped there. The bureau has convinced municipal authorities of the importance not only of providing water-purification plants but also of seeing that they are properly directed by trained operators. The efforts of the bureau have gone still further. Realizing the difficulties confronting some municipalities in getting trained operators, the bureau has helped secure these. In this it has had the co-operation of the engineering schools of the state.

Where new operators have not had the requisite amount of training or where it has been felt that however well trained, initiation into the work of a new position was needed, the bureau has sent one of its staff to stand by the operator until he was thoroughly inducted into his new task. The same general thing is being done on sewage-works. This is supplemented by periodic inspections of the operation of both classes of plants and by the service of a central laboratory fully equipped for water, sewage and wastes investigations conducted by the bureau. Other divisions of the work of the bureau that can only be mentioned in passing have to do with the design and supervision of construction of water and sewerage utilities for all state institutions, mosquito control, the sanitation of hotels and restaurants, the sanitation of jails and convict camps, the sanitary control of the milk supply and of oyster production, and the sanitary regulation of manufacture and handling of mattresses and bedding. On July 1 the bureau took up the sanitary inspection of barber shops.

Sewage-Works in the Carolina Piedmont

The writer's trip across a considerable portion of North Carolina, during which a number of water- and sewage-treatment plants were visited, was made by automobile, through the courtesy of Mr. Miller and under the guidance of George T. Catlett, assistant engineer of the North Carolina Board of Health. Industrial cities are now so numerous in the Piedmont section that a considerable number may readily be visited within two or three days; but obviously only general impressions can be gathered in such a hurried trip. These impressions were very favorable as to the progress being made in water and sewage treatment in North Carolina and as to the part which the bureau of engineering has taken in getting plants built, extended or duplicated where necessary and in seeing that they are properly operated. Already there are several activated-sludge plants in the state. Together these present some interesting variations in treatment. Separate sludge digestion and gas utilization have been provided at one or two of these plants. At Winston-Salem may be seen a direct-oxidation or lime-electrolytic sewage-works with remarkably complete mechanical equipment.

Mill Villages and Villagers

The Piedmont region continues into South Carolina. At Greenville, in the latter state, the Greater Greenville Sewerage District has been formed and has nearly completed Imhoff tanks and sprinkling filters.

Throughout the Carolina Piedmont region the visitor from the North is impressed with the recent and remarkably rapid growth of mill villages and the peculiar status of the latter, which is semi-feudal in character. They take their part in county government, but that touches very little their daily lives and environment, since county government has nothing to do with water supply, sewerage, streets, sidewalks and lighting, which the mills supply without cost to their employees, and apparently in many cases has little to do with education.

Need for Attack on Industrial Wastes

While much has been done and is being done in the treatment of municipal sewage in the Piedmont section of the Carolinas, scarcely a beginning has been made in the treatment of the various trade wastes from the rapidly increasing numbers of industrial plants. In the cities presumably a large part of these wastes goes to the municipal sewers and to sewage-treatment plants. In the mill villages there is no municipality. Each mill and factory owner disposes of the wastes from its houses and factories as it sees fit, and this is almost always by discharging them into the nearest stream. Some of the streams are large, but many are relatively small. They are becoming badly polluted, particularly with industrial waste—already to the detriment of mill owners below. No time should be lost in putting a check on this pollution before it becomes the serious problem that it has long been in the North. The cost of treating the industrial wastes, worked out as an addition to unit cost of product, would be small, and as is the case of all costs of production would be borne by consumers. The subject is worthy of attention of the mill owners and all legislating bodies in the South.

Finally, as to the Piedmont region it may be noted that the growth and prosperity of the municipalities and mill villages is very largely due to the magic of hydroelectric power. Practically all the mill villages are located along railway lines, and most of them in the Piedmont Carolinas have improved interconnecting highways.

As to the South in general, municipal development is progressing rapidly not only in sanitation but also as to a variety of other public works and particularly in the provision of high class schools and other public buildings. Much remains to be done, but the spirit of progress is evident throughout the Piedmont region as well as in other of the rapidly developing sections of the South.

M. N. BAKER.

Municipal Sewer Systems Increasing in Mexico

Municipal sewer systems are increasing in Mexico, according to a recent statement of the situation by A. Guzman, editor of *Ingenieria*, before the Sanitation Short School at San Antonio, Tex. The larger cities have sewer systems, generally combined systems, while the many small towns and villages generally lack sewerage, but increase of urban population is necessitating greater attention to the matter and is compelling consideration of sewage treatment. Pollution of water supplies is somewhat less serious than might be expected because they are largely obtained from groundwater, artesian wells and direct impounding of the runoff from small areas in surface reservoirs, rather than from streams.

Second Bridge Planned Over Danube in Yugoslavia

Plans have been completed for a second bridge over the Danube River near Belgrade, Yugoslavia, at a cost of about $7,000,000. The structure, more than 2 miles long and 60 ft. wide, will accommodate railways, trolley cars and vehicular traffic.

Falsework for Construction of 104-Ft. Dome

Special Centering Designed for Reinforced-Concrete Dome of B'nai B'rith Temple in Los Angeles—Concrete Placed by Air 150 Ft. Above Mixer

By Zara Witkin
Chief Engineer, Herbert M. Baruch Corporation, Los Angeles, Calif.

AN UNUSUAL system of wood centering for the construction of the 104-ft. reinforced-concrete dome on the B'nai B'rith Temple in Los Angeles was designed for the utmost economy and to provide ample clearance for sub-trades working underneath the dome. The design consisted essentially of a heavy central wooden tower, and one concentric ring of posts surrounding the tower. The forms for the dome were carried on concentric purlins resting on meridianal inclined struts which were supported by the central tower, the intermediate posts and the permanent steel girders forming the base of the dome.

Other interesting features of the dome construction were the guniting of the concrete shell and the use of a traveling truss templet to gage the form setting and concrete placing.

Design of Structure—The building is an L-shaped structure in plan, 270x297 ft., the long leg of the L being the main auditorium, which rises to a height of approximately 80 ft. above the sidewalk to the top of the structural steel frame and which is capped by a dome of reinforced concrete rising 57 ft. above the base with a diameter of approximately 104 ft. The shell of the concrete dome is 4½ in. thick at the base, decreasing to 2½ in. thick at the top, and is reinforced by ⅝-in. square steel rods both concentrically and radially. No structural steel exists in the dome proper nor are there any concrete arch ribs under the shell of the dome. The dome is not hemispherical in shape, a meridian section being formed of two quadrant-arcs coming to an apex and whose combined radii, which are equal, exceed the diameter of the dome at the base. Supporting the dome at its base are steel girders framed octagonal in plan. A section of the dome is shown in Fig. 4.

Within the area under the dome there are no structural columns or walls. An ornamental coffered plaster ceiling, specially treated for acoustic purposes, is hung from the structural reinforced-concrete dome, being in effect an inner dome for decorative purposes. The space between the structural dome and the dependent ornamental plaster dome is used for ventilating the auditorium.

Design of Falsework—In designing the centering system to carry the forms, concrete and reinforcing steel of the dome, several factors other than the live loads and wind loads were considered. These were: (1) a minimum of supporting posts or shoring so arranged as to allow for maximum movement, transportation and space on the floor of the auditorium, which was to be used for storage of material and working space for sub-trades; (2) simplicity of erection and ease of ultimate stripping; (3) use by other trades such as the lather and plasterer in placing the inner ornamental dome, the electrician in hanging and wiring the lighting fixtures and power outlets, the decorator and painter in ornamenting the inner dome ceiling and side walls (this necessitated constructing the centering so as to be able to strip it out in portions and provide successive step-down sections for work done below the structural dome); (4) economy.

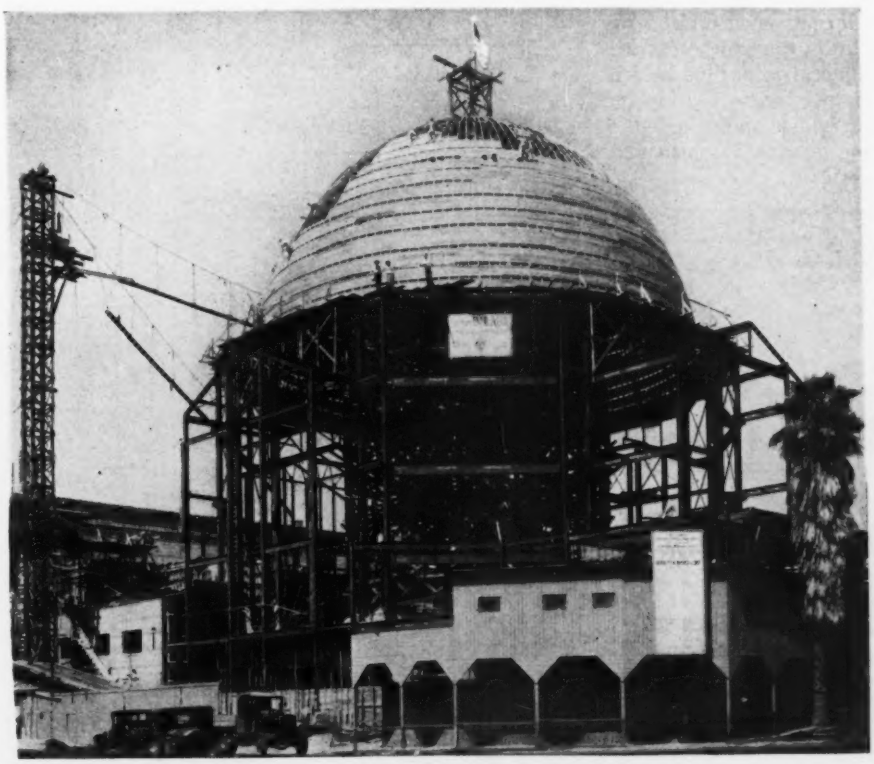


FIG. 1—ERECTING FORMS FOR THIN-SHELL CONCRETE DOME OF B'NAI B'RITH TEMPLE, LOS ANGELES

The following basic data were used for load factors: The shell of the dome totaled 18,000 sq.ft., and the concrete was taken at a weighted average thickness of 3¾ in. A summary of the loads on the dome follows:

Concrete—18,000 sq.ft. 3¾ in. thick at 150 lb. per cu.ft. = 422 tons.

Reinforcing steel—18,000 sq.ft., ⅝-in. square bars spaced 5 in. both ways = 22 tons.

Centering—100,000 f.b.m. (esti-

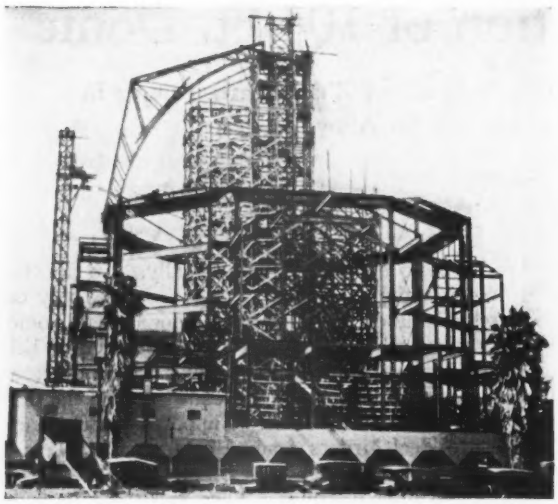


FIG. 2—FALSEWORK READY FOR FORMS, B'NAI B'RITH TEMPLE
Note traveling double-truss templet for gaging form erection.

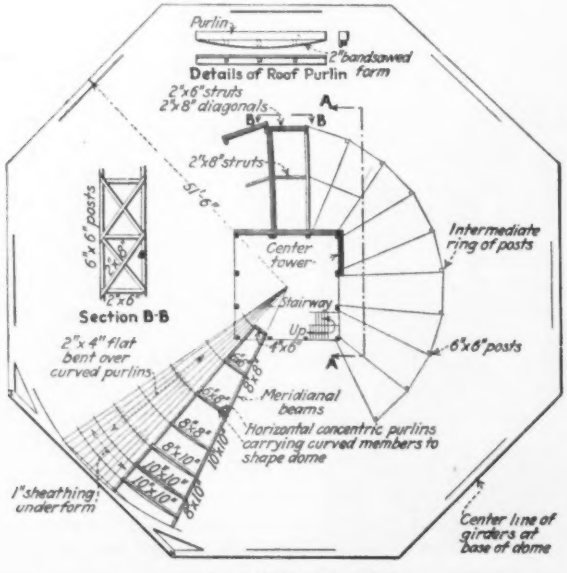
mated) at 2.5 lb. per foot, board measure = 125 tons.
Live Load—18,000 sq.ft. at 25 lb. per sq.ft. = 225 tons.
Wind Load—18,000 sq.ft. at 25 lb. per sq.ft. = 225 tons.
Total, 1,019 tons, or 113 lb. per sq.ft.

To avoid any initial stresses owing to deformation of the shell during construction, the most rigid centering with the smallest possible load deflection consistent with economy was designed. This design was made in the manner of a permanent structure with a safety factor of 3.

The design selected provided for a central tower which would also incase a hoist and a stairway, and one ring of posts placed between this tower and the girders at the base of the dome requiring the longest economical 2-in. lumber sizes for bracing. The loads were to be carried through the forms on circular concentric purlins, which were fastened to meridianal inclined beams bearing on the central tower posts, the intermediate posts and the inclined struts resting on the ring girders. A plan and sections of the falsework are shown in Fig. 3.

By this general method approximately 35 per cent of the entire load was carried directly into the structural steel frame already erected, the remaining 65 per cent being borne by the centering posts. As the contractor had a large amount of 8x8-in. and 6x6-in. timbers on hand, these sizes were selected for the centering. The tower framework consisted of twelve 8x8-in. columns and the intermediate ring consisted of 24 6x6-in. columns. By using the usual column formula it was determined that this system of centering was capable of supporting 689 tons. As but 65 per cent of the total of 1,019 tons was to be carried on the centering, this gave a load of 662 tons, maintaining a safety factor of 3. But considering the efficiency of beam post bracing joints as only 75 per cent of the member strength, this safety factor reduces to approximately $2\frac{1}{4}$.

Inclined beams were designed to span between the tower and the intermediate posts, and between these posts to the ring girders two inclined beams meeting at an angle and jointed and braced completed a meridianal section of the centering. These members were 8x8-in. timbers. A complete crossbracing system, horizontal and vertical, tied the posts rigidly together. Between the meridianal inclined beams were framed horizontal purlins



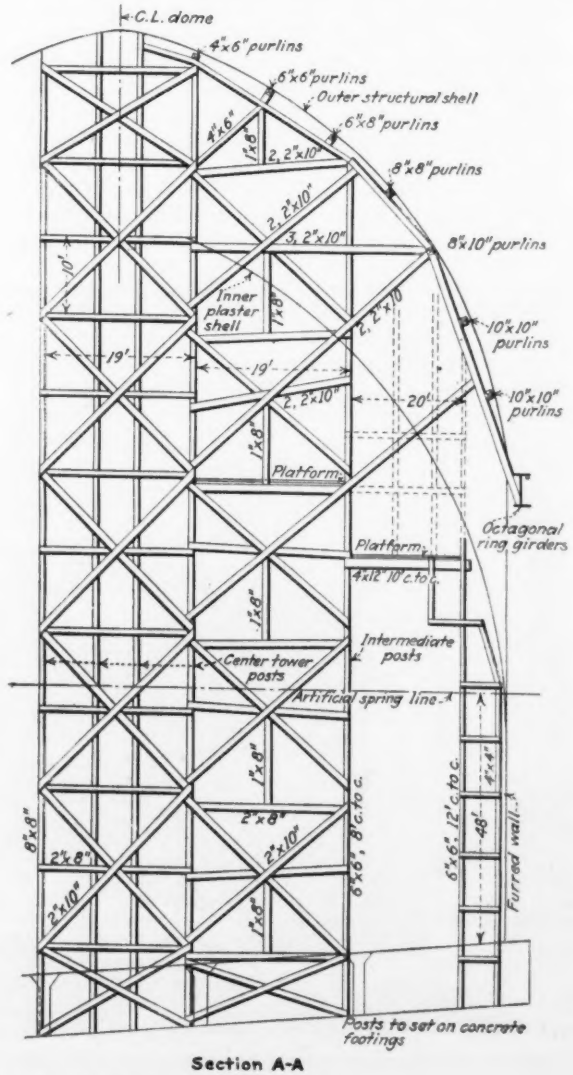


FIG. 3—PLAN AND SECTIONS OF FALSEWORK FOR DOME ERECTION

spaced 10 ft. apart from base to apex of dome. Carried by these were curved purlins cut to the shape of the dome at their respective positions. These curved purlins formed a series of concentric circles immediately under the forms of the dome shell and they governed its shape.

Alternative Centering Design Considered—Several general methods of centering were considered before the central tower design was selected, including light steel trusses supported on a central tower and rim girders, through steel trusses completely spanning the dome, wood trusses supported on a central tower and the side girders, and finally a scaffolding of light posts, 4x4 in., covering completely the area under the dome at the requisite spacing.

Cost estimates and actual bids taken upon tentative designs for the steel trusses eliminated them from consideration. The weight of wood trusses when analyzed was found to be practically the same as the alternative meridianal braced beam construction as finally adopted. Trusses had the disadvantage, moreover, of considerable difficulty of erection and stripping compared with the much lighter beams used and little adaptability to the needs of the subcontractors' work on levels and surfaces

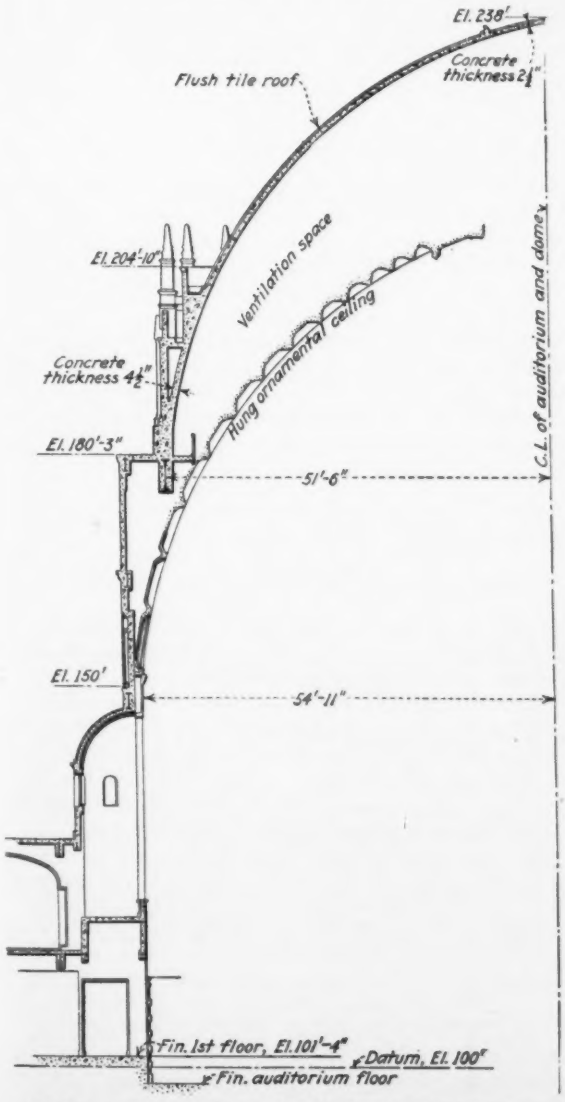


FIG. 4—SECTION THROUGH AUDITORIUM AND DOME

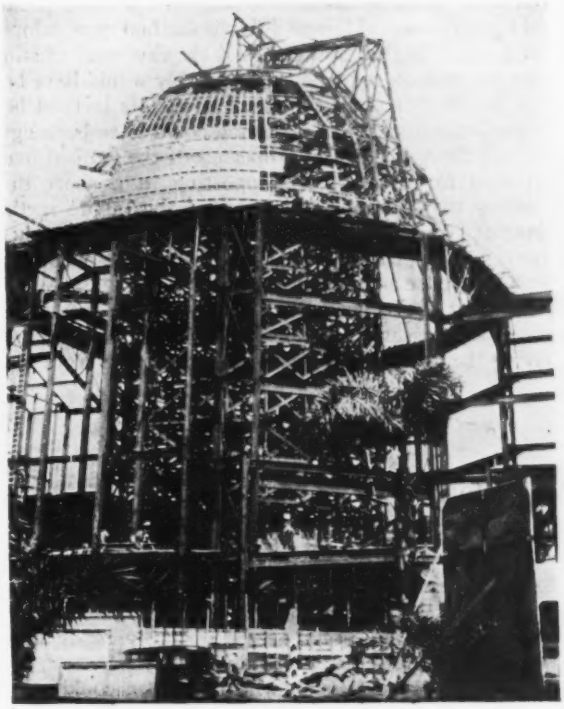


FIG. 5—STARTING FORM BUILDING FOR CONCRETE DOME

beneath the structural dome. Furthermore, the salvage value of the dismantled irregular length of the framed truss members would have been much less than that of the longer uniform beam timbers used.

A design considering equally safe light scaffolding posts over the entire area was discarded because of the following disadvantages: More lumber would be required owing to the great height of the posts with a corresponding increase in labor cost in framing; the use of the floor under the dome would have been completely blocked; and most of all it would have been very costly and difficult to strip because of the large number of pieces and the difficulty of lowering stripped material through the closely woven maze of timbers.

Design of Dome Forms—Upon the purlins were laid meridianally 2x4-in. pieces 20 ft. long, flatwise. Owing to their length these pieces when nailed to the purlins sprang to a smooth curve which formed the dome for the 1-in. sheathing laid to complete the form. For safety and use for the carpenters sheathing the dome, every eighth piece was left out, providing steps and hand holes from which to work (Fig. 1).

To provide for the careful placement of the top section of the centering and the forms and to give as exact a dome form as possible, a full-size double-truss templet was built with a curved bottom chord exactly 8 in. outside the true position of the bottom of the dome shell (Figs. 2 and 5). This truss templet rode on dollies on two circular tracks, one at the base of the dome placed on the steel girders and the other placed on the top of the central tower. The truss was moved around the dome and the members were cut and placed by measuring back the required distance from the curved lower chord.

Pneumatic Concrete Placing—As work on the dome progressed ready for concreting, the constructors urged the use of concrete placed by the cement gun process instead of pouring the thin shell between two forms with

the incidental problem of tamping to eliminate pockets and honeycomb. Ultimately this method was adopted and a much higher strength and density were obtained from the shot-on concrete than probably would have been obtained from poured concrete. Had this method been adopted at the start, the centering could have been lightened, as the quick-setting properties of the gunited material tend to make it self-supporting in a short time, relieving the shoring. Adoption of the gunite method eliminated the necessity of building the concrete hoist tower as originally planned, as the gunite was lifted through a hose outside the dome.

Shooting the concrete was begun at the top of the dome, working around in annular bands 6 ft. wide and playing the gun up and down. The hosemen were hung

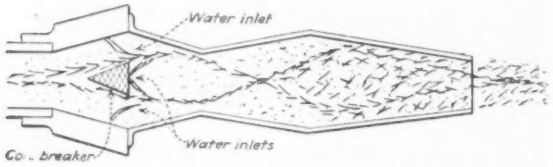


FIG. 6—CORE-BREAKER NOZZLE USED IN GUNITING

from a pipe in the center of the dome by ropes and a life belt. To avoid disturbing the reinforcing steel, special stools were made upon which the men could stand. The work was continued in this fashion until the lower third was reached, which was very steep. Then working from light movable scaffolding the shell was built up from the bottom of the dome to the junction with the part already placed.

To secure the proper thickness of the shell, screeds were placed horizontally every 6 ft. in concentric circles, and a curved templet was used between these screeds to bring the concrete to the desired surface. An interesting accidental condition occurred in that the ropes used by the men hung by life belts had the effect of smoothing the surface as they were continually moved.

Concrete Plant—The plant consisted of an air compressor producing a pressure of 65 lb. and an aggregate and cement mixer placed on the ground, 150 ft. below the top of the dome. From the floor two hose lines led to the point of placing, one for concrete and the other for providing air to blow away the rebound. At the point of placing, a core-breaking nozzle was used for placing the concrete and a hollow chisel-point nozzle was used for the rebound removal. The material was fed from the mixer into the shooting line by a special feed wheel designed to eliminate slug action and to provide a continuous flow of material. The air carrying the aggregate was in the ratio of 200 to 1 volumetrically with the material. The design of the special core-breaking nozzle, shown in Fig. 6, permitted complete hydration of the mass of concrete and eliminated sand pockets in the work by diverting the materials from straight passage through the nozzle to a more thorough mixing action, wetting the usually dry core, and preventing separation of light and heavy particles by momentum.

Personnel and Contractors—The temple was designed by A. M. Edelman, architect, Los Angeles, with Allison & Allison consulting engineers and Paul Jeffers structural engineer, all of Los Angeles. Contract for the construction was held by the Herbert M. Baruch Corporation, Los Angeles, with the writer chief engineer in charge of the work. The Pneucrete Corporation, of Los Angeles, placed the concrete in the dome.

Spacing Suspension Points for Precast Concrete Piles

Formulas and Diagrams for Rapid Determination of Moments, Steel Areas, and Number of Suspension Points for Piles of Different Diameters

By E. G. Paulet

Bridge Department, Louisiana State Highway Commission, Baton Rouge, La.

PROPER methods for handling concrete piles in the casting yard, in transit and at the job are absolutely essential if the greatest efficiency is to be secured from the piles. Cracks will allow water to reach the reinforcing and thus permit corrosion to start, and cracks most often occur during handling of the piles in a horizontal position. Hence proper spacing of the suspension points, coupled with careful handling, is fundamental in the use of precast reinforced-concrete piles. The aim of this article is to provide the engineer, the designer and the contractor with simple formulas and diagrams that will enable him quickly to find the spacing of sus-

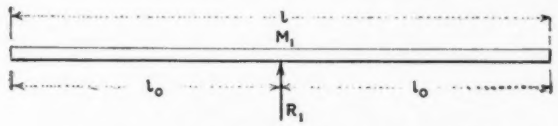


FIG. 1—PILE SUSPENDED AT ONE POINT

pension points, the maximum moment and resisting moment, the maximum length of pile, the steel area required and the best number of suspension points for square piles of different diameters. The formulas are easily understood and the diagrams are illustrated by examples.

Diagrams for unit stresses in steel of both 12,000 and 16,000 lb. per sq.in. have been made in order to meet present practice, a diagram for 12,000 lb. per sq.in. complying with the American Association of State Highway

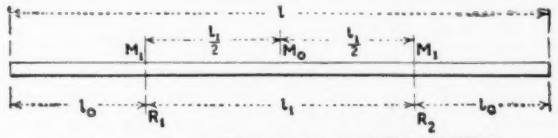


FIG. 2—PILE SUSPENDED AT TWO POINTS

Officials specifications, July, 1927, and a diagram for the 16,000-lb. stress complying with practice commonly used for other types of construction.

Three different cases of suspension will be considered: (1) piles suspended at one point; (2) piles suspended at two points with the reactions and moments equal; and (3) piles suspended at three points, both with the reactions equal and moments unequal and with the reactions unequal and the moments equal.

Pile Suspended at One Point—This case is largely self-explanatory. Referring to the table of notation, $R_1 = Wl$, $l_o = \frac{l}{2}$ and $M_1 = -6\,Wl_o^2$ (Fig. 1).

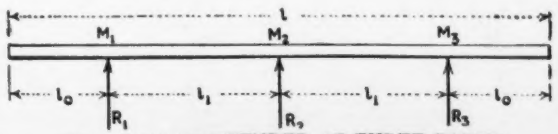


FIG. 3—PILE SUSPENDED AT THREE POINTS

Pile Suspended at Two Points—With this condition of suspension, the reactions and moments are made equal by having $l_0 = 0.207l$ and $l_1 = 0.586l$, and referring to Fig. 2, $M_1 = -6Wl_0^2$ and $M_0 = 1.5Wl_1^2 - M_1$. As stated, the reactions are equal and $R_1 = R_2 = \frac{Wl}{2}$.

A practical dimension should be used for the length l_0 of the cantilever beams of the pile; and such dimensions should be made as nearly as possible equal to the theoretical length. Any variation from the theoretical should be on the plus side. For example, if the theoretical length l_0 is found to be 8.28 ft., the practical dimension should be 8 ft. 4 in. With bending moments M_0 and M_1 calculated, the larger of these should be used as the governing bending moment.

TABLE OF NOTATION

b = side of pile in inches (see Fig. 4).
d = effective depth in inches (see Fig. 4).
l = length of pile in feet.
l_0 = length of cantilever beam of the pile in feet.
l_1 = length of pile between suspension points in feet.
M = resisting moment in inch-pounds.
M_0, M_1, M_2, M_3 = bending moments in inch-pounds.
R_1, R_2, R_3 = reactions in pounds.
W = weight of pile in pounds per linear foot.

Pile Suspended at Three Points—There are two conditions of moments and reaction with this spacing of suspension points. When the reactions R_1, R_2 and R_3 are equal and the bending moments M_1, M_2 and M_3 (Fig. 3) are unequal, $l_0 = 0.1528l$ and $l_1 = 0.3472l$. Under these conditions $M_1 = M_3 = -6Wl_0^2$ and $M_2 = -0.92Wl_1^2$. The reactions are equal to $\frac{Wl}{3}$.

With the above spacing, piles are usually handled with slings connected by an equalizer.

The second condition arises when the reactions R_1, R_2 and R_3 are unequal and the bending moments M_1, M_2 and M_3 are equal. This condition is rare, but when considered, the support of the suspension points should be arranged so that there will be no deflection of the pile at any reaction. For this condition $l_0 = 0.145l$ and $l_1 = 0.355l$. With these values $M_1 = M_3 = -6\ Wl_0^2$ and $M_2 = -Wl_1^2$. $R_1 = R_3 = 0.3225Wl$ and $R_2 = 0.355Wl$.

What was said above concerning the length l_0 of the cantilever beams of the pile is also applicable to the case where three suspension points are used.

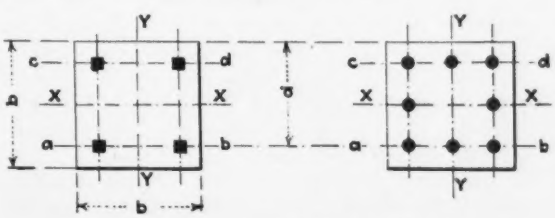


FIG. 4—TWO METHODS OF REINFORCING CONCRETE PILES

Diagrams—For the diagrams, Figs. 5 and 6, it will be noted that unit stress in the concrete has been taken at 650 lb. per sq.in. in both instances, the diagrams differing in that the unit steel stress is 12,000 lb. per sq.in. in Fig. 5, and 16,000 lb. per sq.in. in Fig. 6.

All piles considered are square with 12-, 14-, 16-, 18-, 20-, 22- and 24-in. sides respectively. As shown in Fig. 4, the longitudinal reinforcing steel is symmetrical about the principal axes of the pile. The areas of steel given in Figs. 5 and 6 are for one face only, as along *ab* in Fig. 4; the area of steel along *cd* is the same as along *ab*.

Utilizing the same resisting moments as with Figs. 5 and 6, the lengths of the piles with 50, 75 and 100 per cent impact can be found from Figs. 7 and 8. Fig. 7 shows two separate curves, one set for one suspension point and one set for two suspension points. Fig. 8, although only for the case of three suspension points, has also two sets of curves, one set to be used when equal reactions are considered, and the other set to be used when equal moments are considered.

Examples for Use of Diagrams

Example 1—A 20-in. square pile is reinforced with eight 1-in. square longitudinal bars placed 2 in. from the surface of the pile in the clear. Assuming a 12,000-lb. steel stress, the largest resisting moment will be determined as follows: The area of steel in one face

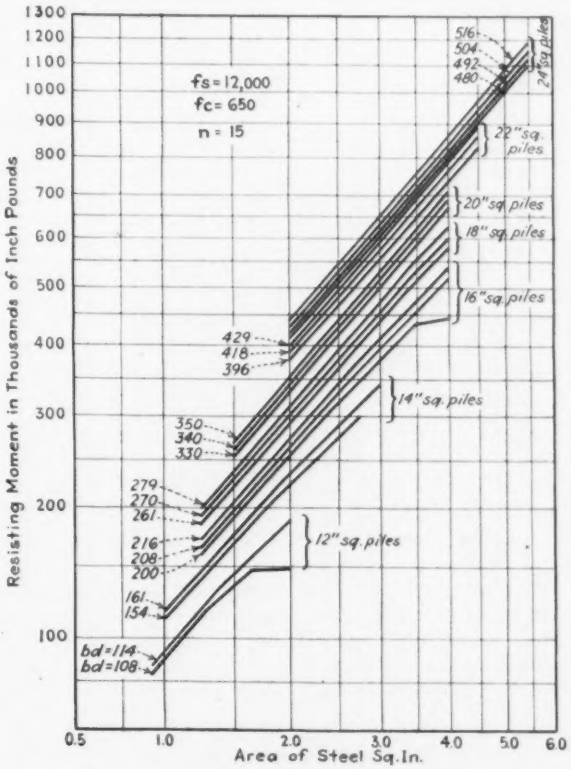


FIG. 5—RELATION OF STEEL AREA TO RESISTING MOMENT WITH STEEL STRESS OF 12,000 LB. PER SQ.IN.

is 3 sq.in. The effective depth d of the section is $17\frac{1}{2}$ in. and the width b is 20 in., so that $bd = 20 \times 17\frac{1}{2} = 350$. Entering Fig. 5 with the area 3 sq.in., tracing vertically to the curve bd equals 350 (20 in. square pile) and then horizontally to the left margin, the resisting moment of 530,000 in.-lb. is found.

When bd falls between two curves related to the same pile, an interpolation will give an answer close enough for practical purposes.

Example 2—Utilizing the same pile as above—that is, 20 in. square and with a resisting moment of 530,000 in.-lb.—the maximum length of pile that can be handled with one or two suspension points when 100 per cent impact is provided will be determined as follows: Entering Fig. 7 at a resisting moment of 530,000 in.-lb. and

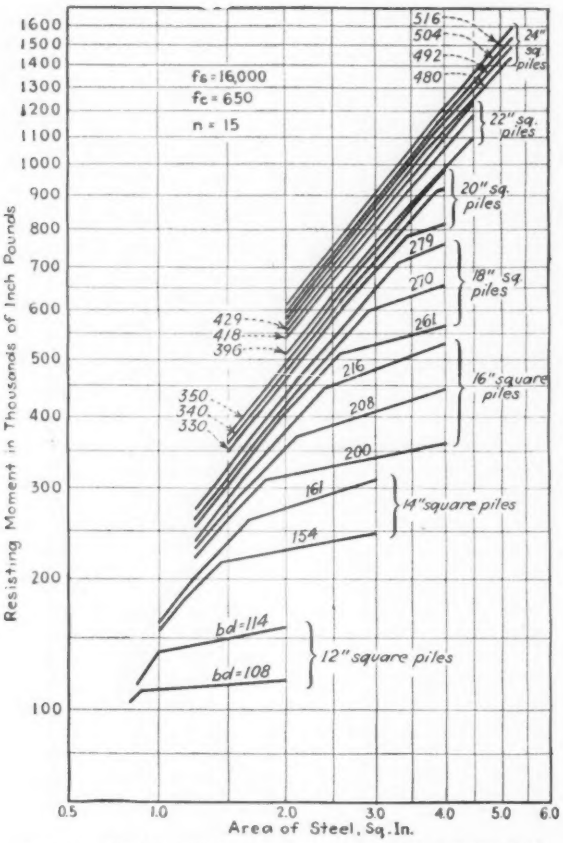


FIG. 6—RELATION OF STEEL AREA TO RESISTING MOMENT WITH A STEEL STRESS OF 16,000 LB.

moving to the right to the dashed line representing $b = 20$ in., and then downward to the scale of length where 100 per cent impact is provided, the maximum length of pile is found to be 19.5 ft. In a like manner the maximum length of pile that can be handled with two suspension points is found to be 47.3 ft.

The above examples have shown the use of the diagrams when the area of steel and impact or the resisting moment and impact were known. If the size of the pile, the impact to be provided for handling and the area of steel were known, then proceed as follows:

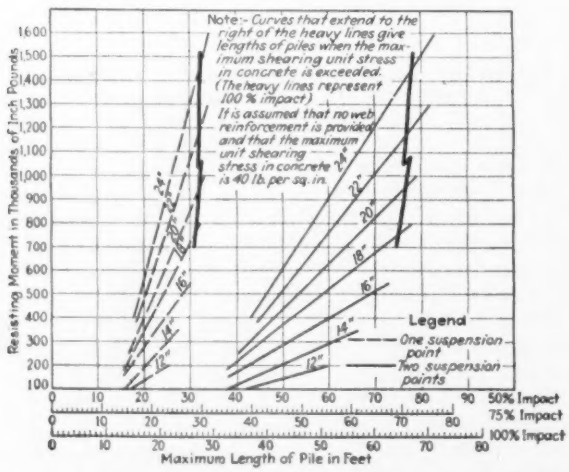

Note:- Curves that extend to the right of the heavy lines give lengths of piles when the maximum shearing unit stress in concrete is exceeded. (The heavy lines represent 100% impact) It is assumed that no web reinforcement is provided and that the maximum unit shearing stress in concrete is 40 lb. per sq. in.
Legend
One suspension point
Two suspension points
50% Impact
75% Impact
100% Impact
Resisting Moment in Thousands of Inch Pounds
Maximum Length of Pile in Feet

FIG. 7—LENGTH OF PILE AND RESISTING MOMENT FOR ONE AND TWO SUSPENSION POINTS
Values given for 50, 75 and 100 per cent impact.

(*a*) Assume the number of suspension points.

(*b*) Find bending moment for the number of suspension points assumed.

(*c*) Enter Figs. 7 and 8 (depending on number of suspension points) with length of pile and impact and find resisting moment.

(*d*) If the resisting moment is smaller than the bending moment, try a greater number of suspension points; if larger:

(*e*) Enter Fig. 5 or 6 (depending on conditions) with the bending moment and see if area of steel is

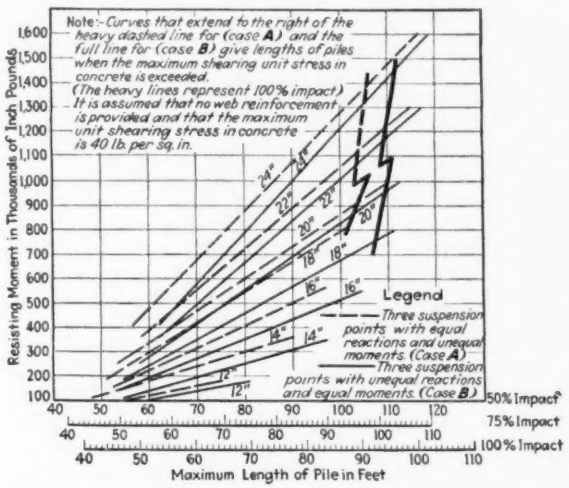

Note:- Curves that extend to the right of the heavy dashed line for (case A) and the full line for (case B) give lengths of piles when the maximum shearing unit stress in concrete is exceeded. (The heavy lines represent 100% impact) It is assumed that no web reinforcement is provided and that the maximum unit shearing stress in concrete is 40 lb. per sq. in.
Legend
Three suspension points with equal reactions and unequal moments. (Case A)
Three suspension points with unequal reactions and equal moments. (Case B)
50% Impact
75% Impact
100% Impact
Resisting Moment in Thousands of Inch Pounds
Maximum Length of Pile in Feet

FIG. 8—LENGTH OF PILE AND RESISTING MOMENT FOR THREE SUSPENSION POINTS
Curves are given for the two conditions, one of equal reactions and one of equal moments. Lengths of pile are obtainable for impacts of 50, 75 and 100 per cent.

larger than that given in problem; if so, the section of the pile is all right.

(*f*) If the area of steel is found to be smaller than that given, a new design for the section of the pile should be made considering the pile as a beam reinforced for compression and tension.

Large Dirigibles Being Built for U. S. Navy

Two rigid airships, each of which exceeds the "Graf Zeppelin's" gas capacity by 75 per cent, are now being built for the U. S. Navy at Akron, Ohio. These ships, described by Dr. Karl Arnstein, of the Goodyear-Zeppelin Corporation, in the May number of the *Journal* of the Society of Automotive Engineers, will be of a size and type eminently suitable for a long-distance commercial vehicle. They are to be helium inflated and have a gas capacity of 6,500,000 cu.ft.

The structural features of such a ship as this could easily be incorporated into a commercial mail and passenger-carrying airship. The general data for a passenger ship of this gas capacity would be as follows:

Over-all length, ft.	785
Maximum diameter, ft.	133
Over-all width, ft.	138
Over-all height, ft.	147
Fineness ratio	5.9
Nominal gas capacity, cu.ft.	6,500,000
Dead weight, lb.	210,000
Total lift, lb.	403,000
Useful lift, lb.	193,000
Maximum power, hp.	4,800
Maximum speed, m.p.h.	87
Cruising speed, m.p.h.	75

The range of the ship, while carrying 40 passengers, 28,000 lb. of mail and express freight, in addition to 55 members of the crew, would be about 4,700 miles at top speed, 6,100 at a cruising speed of 75 miles per hour and 10,000 at a cruising speed of 60 miles per hour.

Some Recent Points Decided in Engineering Law

REVIEWED BY HERBERT BRAASCH
Attorney at Law

DECISIONS reached in cases tried in the higher federal courts and in the state supreme courts are summarized in these articles appearing from time to time in *Engineering News-Record*. The last group will be found in the issue of May 16, 1929, p. 799.—EDITOR.

Subcontractor's Liability to Workers of Other Trades

William Angus, Inc., did the masonry work on a building construction job, and the Dickens Erecting Company raised the steel. Employees of the masonry contractor erected an unsafe scaffold, the defect not being visible. The scaffold gave way while a steel worker was walking along it. The Angus company was held liable for damages.

Negligence is gaged by the ability to anticipate and, since use by other workmen was permitted or intended, and could be anticipated, the Angus company was liable. Compensation insurance did not protect this contractor, because the injury was not to one of its own employees, and damages were not restricted to the workmen's compensation schedule.—*McGlone vs. William Angus, Inc., New York.*

No Deficiency Judgment on Lien Foreclosure

Subcontractors and material men supplied work and materials to a general contractor on a project on which they filed liens. The property was sold but did not bring enough to pay the liens in full and the lien holders sought to recover the difference from the owner. It was held their claims against the owner were only against this property and not against him personally.—*Golden Gate Building Materials Company vs. Fireman, California.*

Contractor's Rights When He Breaks Contract

Under a contract to lay walks and curbs at a unit price per foot the contractor made all excavations (about one-third of the total cost) and then refused to continue, abandoning the work. After completion by the owner the contractor sued to recover the value of the excavation work. He can recover nothing.

The situation is to be distinguished from a severable contract where a unit price is to be paid or become due on completion of units. Therefore, if the contractor had completed only 100 ft. of walk and curb, he would have become entitled to payment upon completion of each unit, unless the contract otherwise provided. In that situation he would be justified in stopping work or abandoning the contract if he were not paid. Here no single unit had been completed and under the agreement the contractor was entitled to nothing.

The doctrine of substantial performance comes to the aid of a builder or contractor who has not complied with his contract to the letter but has substantially completed the work in good faith. He may recover the price with a deduction for his deviation. Not enough work had been done to bring the construction within this rule.

Another theory entirely independent of the contract of the parties sometimes permits recovery. One person may not benefit at the expense of another. If goods are delivered to the wrong person, who uses them, that person must pay an amount equal to the benefit received. Work done upon land or upon a building, however, cannot physically be returned; therefore acceptance of the benefit by the owner is more difficult to show. Hence while a contractor deliberately abandoning work without cause may recover nothing, a contractor negligently or improperly performing a contract in good faith, though he has no right under his agreement which he has broken, will be allowed the value of his work after deductions for his breach or the price minus the cost of completion.—*Kelley vs. Hance, Connecticut.*

Use of Plans Limited to Single Project

A contract provided that plans and specifications for construction work be furnished and stipulated that the use of the plans was to be confined to that one project. However, they were also used on other work. The limitation upon use was held not to be in restraint of trade and damages were awarded equal to the cost of having such plans prepared.—*Electric City Brick Company vs. Minter, Georgia.*

Creditors Affected by Assignment to Finance Company

William Hellbach had plumbing contracts for several high schools under which payments were to be made on specified dates. To obtain financial aid he sold these claims along with other accounts to a financial company, making no mention of the fact that payment was conditional upon a certain completion stage of the work.

General creditors of the plumbing contractor later becoming aware of his financial condition held a meeting and agreed not to force payment of their bills but to have a committee manage Hellbach's contracts. Had creditors not refrained, Hellbach could not have completed the contracts; they would have been taken over by the surety company and the profit in them would have been lost under such management and Hellbach's assets decreased that much.

To prevent possible cancellation by the Board of Education, the contracts were not assigned to the committee, and the work was carried on in the name of Hellbach. The committee furnished no money but simply refrained from collecting their accounts in order that Hellbach could use his money to finish the work.

At the creditors' meeting a finance company representative was present and stated that it had a preferred claim, allowed the committee to go ahead with the work, gave no notice to the Board of Education of the assignment to it and permitted the committee to receive the checks and then demanded them from the committee.

The finance company was held to be so entitled. No notice of the assignment to the Board of Education was necessary. The finance company had no knowledge when the assignment was made to it that the money was not payable on the due date but depended upon work to be done; therefore it was an innocent party. Though an assignment of the contract to the committee would have extinguished the finance company's chance for payment, the committee chose to carry it out in the contractor's name. Though enforcement by the creditors of their claims would have prevented any money ever becoming due, the creditors did not actually furnish the money, so they do not have a direct claim to the checks. There was nothing inequitable in the action of the finance company, since its representative stated it had a preferred claim and since the committee had all of Hellbach's books and could know of the whole transaction.—*Finance & Guaranty Company vs. Creditors of Hellbach, Maryland.*

Designing Steel Supports for 1,400-Ton Steam Turbines

Frames Over 40 Ft. High Carry Largest Machines Yet Built—Unusual Details Result From Great Weight, Vibration and Cramped Layout

By F. A. Ericson

Structural Engineer, Thomas E. Murray, Inc., New York City

THE structural problems involved in providing supports for such moving equipment as motors, engines, generators and pumps are often unusual. When the machines to be carried are steam-turbine generators weighing close to 1,500 tons and when the supports must be of steel some 40 ft. high above the foundation and fitted into a building not designed to receive them, the resulting problem is indeed complicated.

Such a problem has resulted from the installation of two such generators in the Hell Gate plant of the United Electric Light & Power Company, and of one similar machine in the East River plant of the New York Edison Company, both in New York City and all representing the largest units of their type yet built. In the Hell Gate station a 160,000-kw. Brown-Boveri machine and a 165,000-kw. Westinghouse machine, the former shown in one of the accompanying illustrations, have recently been installed. The generator in the East River station of the New York Edison Company is a 160,000-kw. General Electric unit. In installing each of these the major problem was the same, although complications of layout made the actual structural framework in the different installations quite unlike. Among other reasons, steel was considered more satisfactory than any other material because it occupies a minimum amount of room and provides a place for the necessary auxiliaries within the frame.

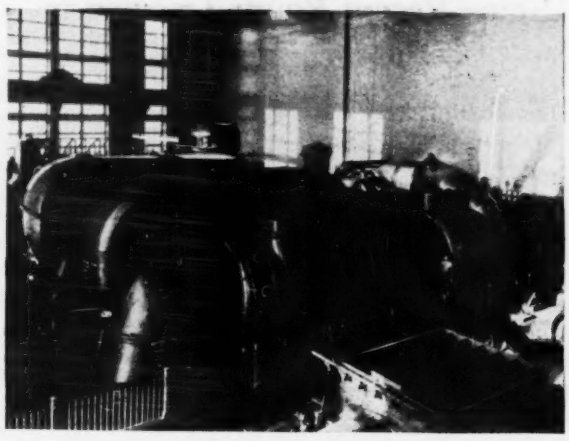


FIG. 1—THE 160,000-KW. TURBO-GENERATOR IN THE HELL GATE STATION OF THE UNITED ELECTRIC LIGHT & POWER COMPANY, NEW YORK CITY

Hell Gate Installation—The Hell Gate station, as originally planned in 1921, was designed for eight units

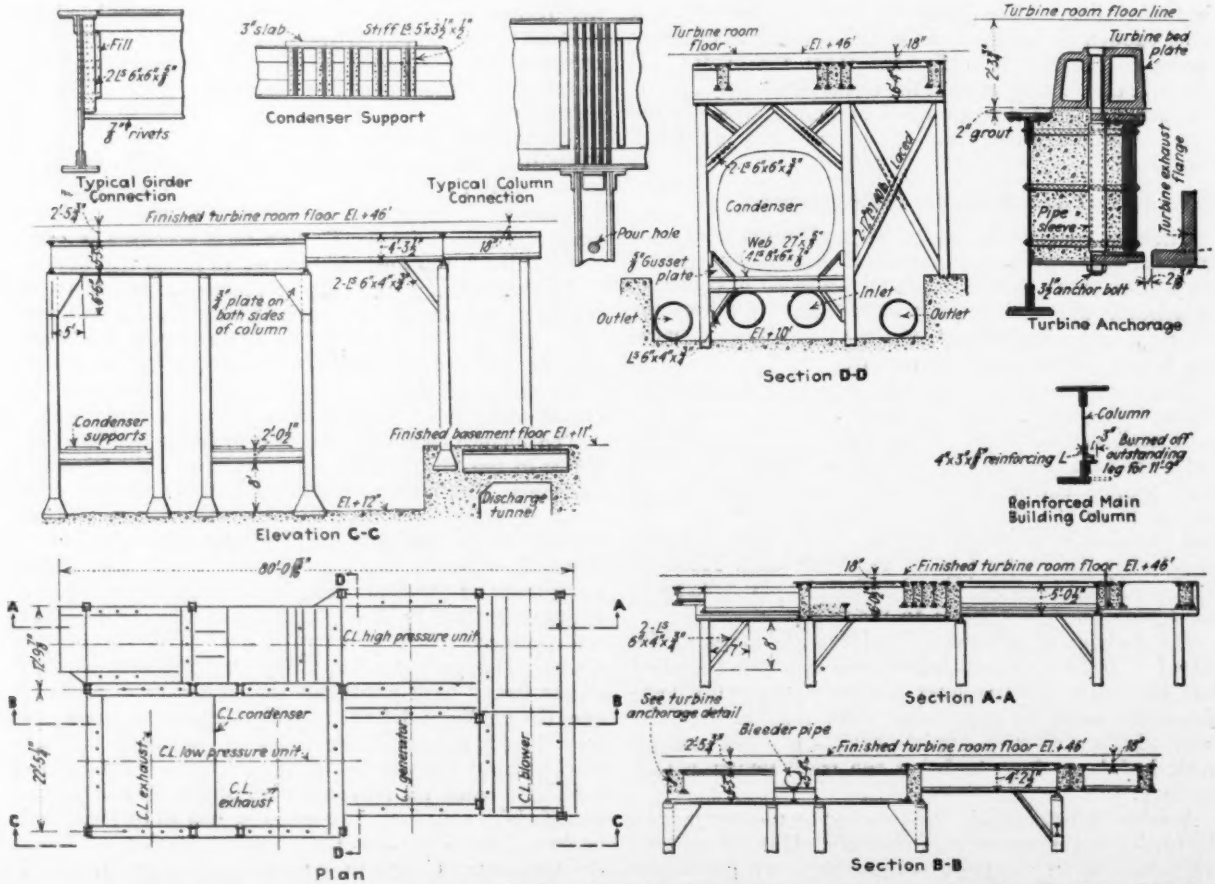


FIG. 2—DETAILS OF STRUCTURAL FRAMEWORK FOR SUPPORTING 1,400-TON TURBO-GENERATOR IN HELL GATE STATION, NEW YORK CITY

with an ultimate capacity of 280,000 kw. Four units were installed originally, two of 35,000 kw. each and two of 40,000 kw. each. When additional capacity was needed, one 35,000-kw. single-cylinder and two 50,000-kw. cross-compound turbo-generators were added, the last one in 1925. In 1926 arrangements were made for the installation of a 160,000-kw. turbo-generator and in 1927 for a 165,000-kw. turbo-generator, both cross-compound.

The 160,000-kw. turbo-generator was installed within the original station, while the 165,000-kw. machine was placed in an extension built to the south of the original turbine room. The problem in the first instance was to provide a structural steel frame supported on a foundation at El. —1 to carry the machinery at the elevation of the turbine floor 47 ft. above. The loads to be carried consisted of the turbo-generator unit, which weighed 1,407 tons, and a condenser, which under normal working conditions weighed 705½ tons. An adequate structural support could easily be designed for static loads of these amounts, but the pulsations of the generator had to be taken into account in this case. Therefore it was necessary to design the structure for changing stresses in a horizontal as well as in a vertical direction. These assumed stresses were largely a matter of judgment. For one thing they varied according to the degree of accuracy attained in balancing the machine. Thus, if after designing the structural supports as rigidly as possible, operation of the unit produced excessive vibrations, steps would have had to be taken to adjust the machine to run more smoothly.

With the design load decided upon, however, the most serious problem was encountered—that of finding room in the already overcrowded building for the columns and in so placing these columns and the necessary cross-bracing that they would not interfere with the complicated piping layout for steam, circulating water, etc. Piping was large, 54 in. in diameter, making it inflexible to move. There was also the desirability to use pipes in as straight runs as possible. The net result was a conspicuously irregular column spacing as shown in Fig. 2. All columns are box sections built up of two 15-in. 55-lb. channels and two 20-in. cover plates. Some have 14-in. reinforcing plates on the webs of the channels, giving a maximum sectional area of 174 sq.in. Particular atten-

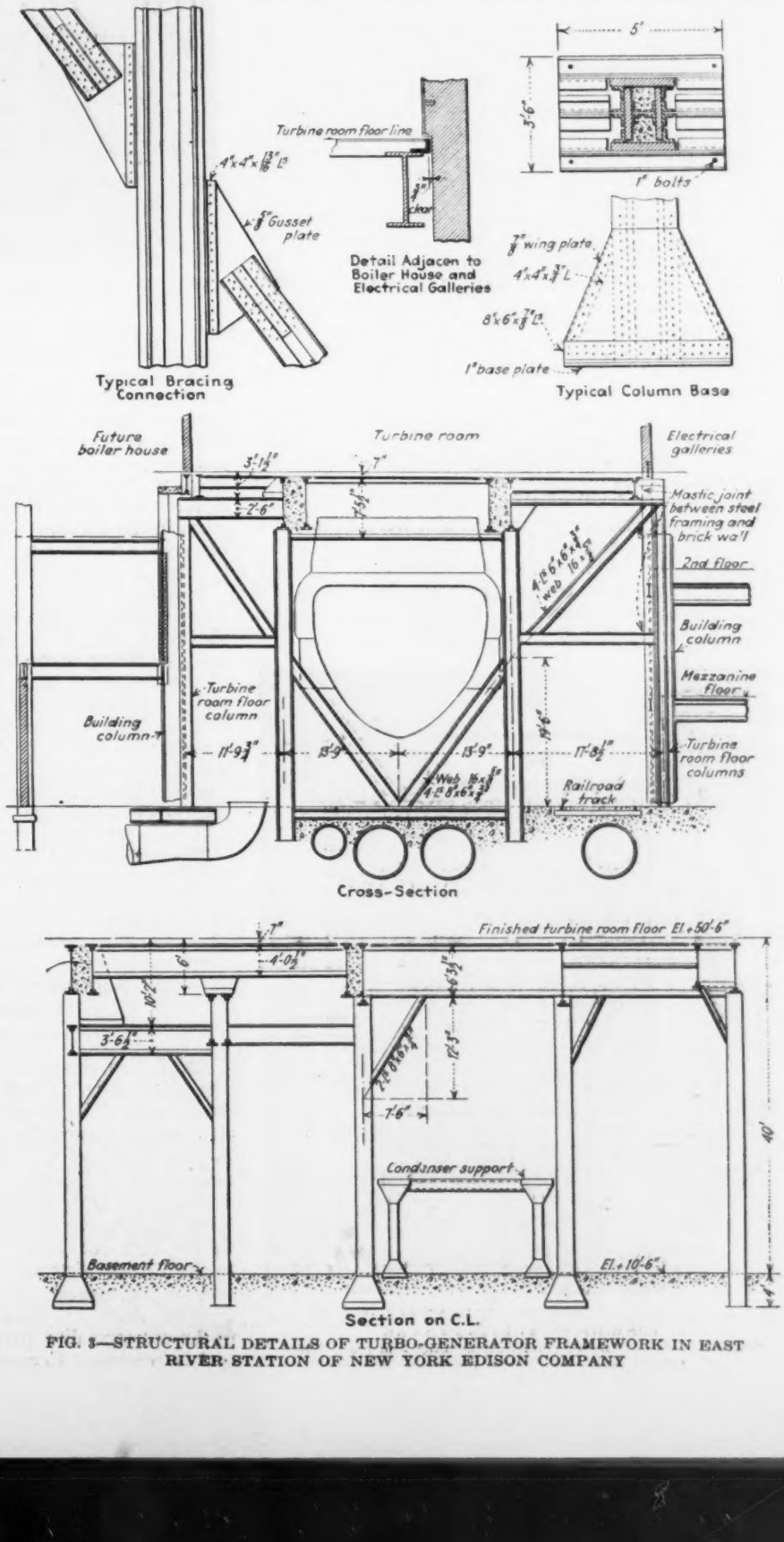


FIG. 3—STRUCTURAL DETAILS OF TURBO-GENERATOR FRAMEWORK IN EAST RIVER STATION OF NEW YORK EDISON COMPANY

tion was paid to the bracing and to all connection details in order to make the structure as nearly rigid as possible.

On account of irregular base plates for the turbo-generator and because of the irregular column spacing, it was impossible to use continuous longitudinal girders. The arrangement shown in Fig. 2, section *BB*, along the center line of the condenser, had to be used in order to provide room for the bleeder pipe which fastens directly under the turbine bedplate. The shallow depth and special section girders used were also necessary in order to clear the circulating pipes, condenser, etc. The other longitudinal and transverse sections indicate the cut-up character of the work and the different methods of bracing that had to be used in order to clear the equipment and still give the required stiffness to the structure.

The large space required for the condenser (Figs. 2 and 4) necessitated raising the turbine floor 5 ft. from the old level and making a pit 10 ft. deep in the basement at the steam end. All column girders and bracing were designed to keep vibration within practical limits. Concrete fill was used between girders in order to add weight and to minimize these vibrations. The supporting framework is isolated from the building steel but is tied to the turbine room floor, as shown in Fig. 2. The columns rest on concrete carried to rock in order to prevent unequal settlement.

For the 165,000-kw. unit the clearances in some respects were even closer than those just outlined. As an example, one of the old building columns had to be cut and reinforced to give sufficient clearance for the main steam pipe. A detail of this is shown in Fig. 2. The maximum column sections for this unit were slightly less than for the other one. The weight of the turbo-generator was 1,328 tons, of the condenser 705½ tons. The maximum girder section was 198 sq.in. The weight of the steel in this framework was 575 tons, as compared with 434 tons in the one described above.

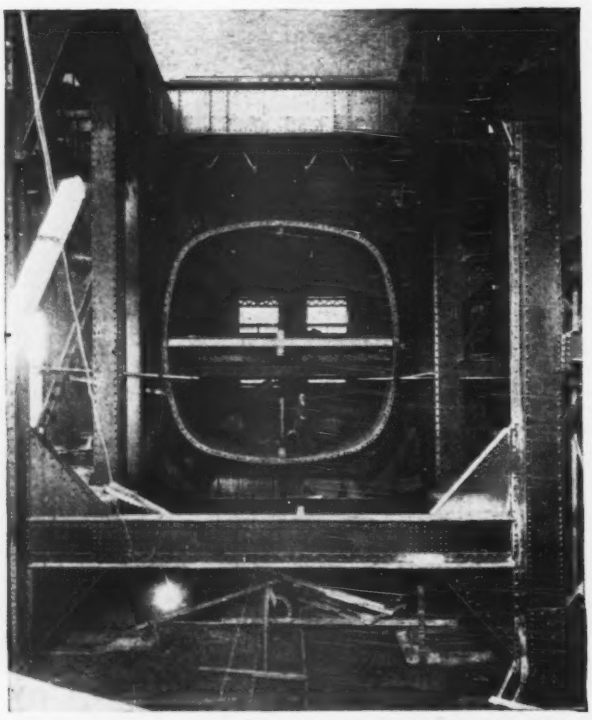


FIG. 4—INSTALLING THE CONDENSER IN THE TURBINE SUPPORTING-FRAME
Note the relative size of condenser opening and man. Turbine is to be installed on girders at top.

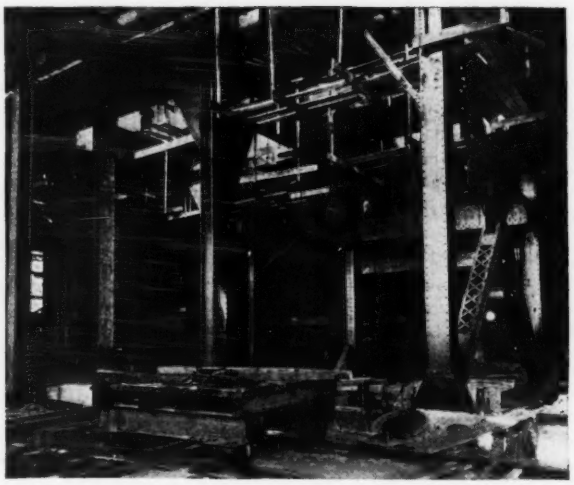


FIG. 5—INTRICATE AND HEAVY STEEL SUPPORTS FOR TURBO-GENERATOR IN HELL GATE STATION

East River Station—The East River Station of the New York Edison Company, as originally planned in 1925, provided for single-cylinder 60,000-kw. units. The 160,000-kw. tandem unit installed in 1929 naturally takes up considerably more space than was planned for and necessitated a quite different arrangement from that which was originally contemplated. The columns had to be located so as to clear existing suction and discharge pipes in the building foundation, as in most cases these pipes were too near the floor to allow the installation of grillages to bridge across them.

In order to provide adequate bracing, the turbine room floor framing and its supporting columns were utilized as shown in Fig. 3. It was found impossible to secure enough bracing on the turbine foundation proper because of the arrangement of the condenser and other equipment. Incidentally, the turbine floor had to be raised 8 ft. in order to provide room for the condenser. The framing also had to be designed to pass railroad cars as shown. The turbine foundation and turbine room floor steel are isolated from the building steel. All columns rest on a concrete mat 7 ft. thick, heavily reinforced and built on piles.

The designer and builder of the structural steel framework for the East River station was Thomas E. Murray, Inc., New York City.

Low Rainfall in Great Britain During the First Half of 1929

Editorial Correspondence

Rainfall in almost all parts of Great Britain for the first six months of 1929 was less than 70 per cent of the average, while in some parts it was under 50 per cent. At Camden Square, London, the total fall from January to June inclusive was 52 per cent of the average. In most parts of England, Wales and Scotland June was a very dry month, the total precipitation in some places being down to 40 per cent. At Camden Square it was 64 per cent for June. In striking contrast, according to the British Meteorological Office, more than 180 per cent of the average June rainfall was recorded in the extreme north of Scotland, more than 130 per cent in the corresponding part of Ireland and about 150 per cent in southwest Cornwall.

Engineering Literature

A Monthly Review of Books and a Listing of New Publications

Economics of Highway Bridge Types

REVIEWED BY SEARCY B. SLACK

Bridge Engineer, State Highway Department of Georgia

ECONOMICS OF HIGHWAY BRIDGE TYPES—By C. B. McCullough, B.S., LL.B., C.E. Chicago: Gillette Publishing Co. Cloth: 6x9 in.; pp. 246; illustrated. $5.

The method of attack on the problem of highway bridge design, together with the data for making approximate estimates of quantities and cost of various types of bridge construction, presented by the author in this book, will be useful to all interested in this field. It will be of particular value to students and other engineers whose data and experience on highway bridge work are limited and should serve as a check to the more experienced designers.

All too frequently bridge design is regarded as merely a matter of stresses and providing a sufficient amount of opening. Types of construction are discarded from prejudice or lack of proper information, and maintenance features are overlooked. The author gives a well-rounded discussion of many phases of the problem which sometimes do not receive proper consideration, and his experience in both construction and maintenance gives weight to his views.

After an introduction and a perhaps somewhat too concise discussion of the general factors controlling type selection in the first two chapters, the main theme of economic analysis is taken up in the third chapter, where the economic equation is worked out, giving consideration to capital costs, maintenance and renewal costs, insurance, operation and rental values.

The data and curves for estimating quantities of timber trestles and trusses, concrete substructures and superstructures and steel beam and truss spans given in the fourth chapter represent very fairly current practice in highway bridge construction. A large amount of useful information is to be found here. Except in one particular the quantities check very well with designs of similar types in the Southeast. The quantities of steel shown for steel deck-truss spans are somewhat more than the quantities for through-truss spans. This is due to added width and extra weight required for concrete rail, the author explains, but there is certainly a question as to whether or not a change in rail type is justified if it is to sacrifice the economy generally found in deck-truss type of construction.

Under culvert types has been included a very brief discussion on loads for culverts due to different installation conditions. This information deserves careful study of all engineers responsible for culvert design or construction.

It is to be regretted that the cuts of the quantity curves were reduced to such small scale that it is difficult to read them and interpolate properly. Ease of reference would also have been improved by a little more care in placing the cuts and illustrations to fit in better with the explanatory text.

The fifth chapter, on renewal and maintenance cost, is perhaps the most important section of the book. Information on renewal and maintenance cost on highway bridges is very meager, and these factors, as is pointed out by the author, should largely govern the proper economic solution of bridge design. The method of superimposing maintenance curves on annual renewal curves as a base is original and well thought out.

It is unfortunate that more data on expected life, maintenance and renewal cost on creosoted timber were not available, as this type of construction is becoming very popular in highway bridge work. The life shown for untreated timber is somewhat longer than is generally to be expected, but this is probably due to the excellent grade of timber available in Oregon. These data should not be considered general but should be modified for different sections.

The concluding chapters, the sixth and seventh, cover unit costs and give an example illustrating the solution of a problem by use of data and methods described in the preceding chapters.

The book is well illustrated and the pictures and drawings are helpful in visualizing the types of construction to which reference is made.

Yale's Scientific School

HISTORY OF THE SHEFFIELD SCIENTIFIC SCHOOL of Yale University, 1846-1922—By Russell H. Chittenden, Director, 1892-1922. New Haven, Conn.: Yale University Press. London: Humphrey Milford. Cloth; 7x10 in.; pp. 610; many halftone portraits and views of buildings. $10.

The first official steps toward the establishment of what was to become the Sheffield Scientific School were the passage of resolutions by the Yale Corporation on Aug. 19, 1846, providing for a professorship of "agricultural chemistry and of vegetable and animal physiology," and also in practical chemistry, with provisos in each case that the corporation was not to be chargeable for the resulting expense—which in effect meant no pay for the professors except fees by students. In 1852 a half-dozen men received the degree of Bachelor of Philosophy. In the same year Prof. William A. Norton proposed to "open a School of Engineering, sustain it at my own expense, and provide it with the necessary apparatus; receiving all the emoluments of the same." He added: "The plan will be essentially the same as that of the School of Engineering organized by me two years since at Brown University, which met with good success. . . . It will also be similar to that of the Harvard School." The Yale Corporation voted on July 27, 1852, to accept the proposal. From these beginnings came the Sheffield Scientific School, with various other departments added from time to time.

Two handsome volumes detail the history of the school, its relations to Yale College and Yale University, and to scientific and educational progress from 1846 to 1922. Much of the space is devoted to the many professors associated with the school during that period, their services at New Haven and their contributions to science and literature. Among the names in the list, some of men who soon left New Haven and became notable at other institutions, were Benjamin Silliman, Jr., Daniel Coit Gilman, William P. Trowbridge, Francis A. Walker,

Augustus J. Du Bois, the author of this history, L. P. Breckenridge, John C. Tracy, Charles J. Tilden, Charles F. Scott and William T. Sedgwick. Naturally much space is given to Joseph E. Sheffield, his benefactions and unflagging support through many years.

Wood Construction Practice Recorded

REVIEWED BY C. R. YOUNG

Professor of Civil Engineering, University of Toronto

WOOD CONSTRUCTION: Principles, Practice, Details.—A project of the National Committee on Wood Utilization prepared under the direction of a control committee by Dudley F. Holtman, construction engineer, National Committee on Wood Utilization. New York and London: McGraw-Hill Book Company, Inc.; Cloth; 6x9 in.; pp. 711; 233 illustrations. $6.

Those whose interest in structures very largely gathers about steel or reinforced concrete are in danger of ignoring the fact that steady progress is being made in the more efficient application of timber to meet the needs of the constructor. It can in truth be said that the development of practice in wood construction has in recent years gone much beyond the written records of the art. While for specialists who are constantly working in this field the shortcomings of the literature might be of no consequence, much loss is incurred through the lack of readily available information for the occasional designer of structures and for those who are making a beginning in the field.

One aspect of the movement for the elimination of waste in industry initiated by Herbert Hoover was the setting up under his guidance of the National Committee on Wood Utilization. The committee, conscious of the waste that arises through inefficiency in the utilization of the country's timber resources, undertook to have the book under review prepared. To this task, with a result that is admittedly gratifying, Dudley F. Holtman applied himself with commendable industry and understanding under the general direction of a control committee.

The book is a record of the best modern practice in wood construction at the time of writing. It is not a work on structural design in the field of timber construction, and replaces neither Jacoby, Dewell nor Gesteschi. It does not contain a detailed record of recent researches in timber mechanics, or applications of structural theory to worked-out designs of structures or their members or details. It is an entirely different phase of the problem of timber utilization that has concerned the author. He has produced not a work on the theoretical side, but one that is wholly practical in character, constituting as it does a record of what is good and what is bad in rules, arrangements, devices and details.

Chapter I, devoted to factors affecting the use of wood in construction, concerns the timber resources of the United States, the composition and structural properties of wood, the defects encountered and the need that has arisen for a revision of the rules for strength grading. In Chapter II are given in detail grading rules conforming to the regulations of the American Lumber Standards, which have been adopted by the industry in co-operation with distributors and consumers of lumber under the auspices of the Department of Commerce. Principal woods used in building and construction are discussed in detail in Chapter III, while in Chapter IV are presented many valuable rules for the identification of common woods. The user of timber who encounters the perennial uncertainty as to whether he is getting the hoped-for species of wood, whether Douglas fir, long-leaf yellow pine or other species, will find something of interest in this portion of the book. Chapter V concerns preservative treatment, and Chapter VI is devoted to the use of paints and stains. The southern half of the continent will read with interest of methods of preventing termite damage in Chapter VII. Light building construction is outlined in the 109 pages of Chapter VIII, while millwork is given 86 pages in Chapter IX. The structural engineer will find the 95 pages of Chapter X devoted to heavy timber construction of value in fixing upon structural forms and details. Chapter XI, given over to temporary construction, might well have included some mention of timber chuting towers, used to a considerable extent in spite of the entry of steel into this field. An appendix of 91 pages containing many tables of value to the user of timber concludes the volume.

Mr. Holtman has done his work well. The style is clear and direct and the illustration of points that require it has been effectively secured through the many excellent drawings and photographs contained in the volume. As is inevitable in a work of the magnitude of the one under consideration, there are small lapses that might with profit receive attention in any future editions. For example, the expression, "The facilities of the Department of Commerce were at the service of the committee most liberally," contained in the preface, is at least unusual. Nor does an expression such as "The damage done by knots is not due to the knot material's being inherently weaker than" (p. 27) conform to the best usage. Fig. 18(*a*), entitled "End and Through Checks," does not appear to square with the definitions of checks and shakes given on p. 31. In the list of post caps on p. 432, the name of one well-known variety is misspelled, while on p. 492 the word lamellas is in one instance misspelled. Roofs of lamella construction in timber have attained a greater clear span than the 130 ft. mentioned by the author. For example, the clear span of the roof in the arena of Fort Erie, Ont., is 136 ft. In ascertaining the safe span of timber beams based on flexure (p. 536) the author might well draw attention to the need for harmonizing units when equating the bending moment to the resisting moment.

Admittedly this is a wisely conceived and a well-carried-out piece of work. No engineer, architect or constructor who has to do constantly with timber can afford to ignore the vast amount of useful material that has been assembled for his benefit. As a work of reference for the guidance of the designer as well as the actual constructor, it will be found invaluable.

To Preserve the Countryside

THE NEW EXPLORATION: A Philosophy of Regional Planning —By Benton MacKaye. New York: Harcourt, Brace & Co. Cloth; 6x9 in.; pp. 235; illustrated, with 25 maps. $3.

A serious defect of this book is its lack of an introduction setting forth the author's thesis and methods of giving it support. That lack makes it necessary for the reader to work out a synopsis of his own, which he cannot do until he has read the book from cover to cover. This is too much to expect from the reader.

The author's real thesis appears to be that to stem the tide of "metropolitan" overflow into surrounding territory incident to what may be called, broadly, the industrial revolution, barriers should be set for the protection of the countryside. These would consist of mountain and other reservations at right angles to each other, as far as might be, with trails for hikers and with motor high-

ways controlled as to number and character of buildings along them. Supplementary to this the author proposes "intertowns" or villages where there would be a small centralization of people, industry and social life. Cities would be relatively small, judging from one or two hypothetical illustrations; their overflow would go to the "intertowns." No consideration is given to existing metropolitan districts, except to picture their evils, as conceived by the author, and to alleviate them by countryside planning.

To the author, regional planning, as the term is commonly used, deals with metropolitan areas, whereas he is concerned with preserving the "indigenous environment" of a large part or the whole of an entire state, or all New England, or the entire Appalachian region, "indigenous environment" meaning primitive nature, touched but not greatly altered by man.

Besides the lack of an introduction, already mentioned, the real message of the book is obscured by an overelaborate machinery of panoramics and parallels. These are designed to show the evils of uncontrolled commercial industrialism in city and country alike, and the benefits that would flow from the protection of the countryside from the "metropolitan invasion" and in preserving the character of primeval regions, while at the same time making them available without desecration. There are a number of these chapters, each well written, standing by itself, but outrunning the needs of the book as a plea for public reservations, mountain trails and motor highways through country kept rural in character, all of which, practically considered, is the main objective of the book. The pains taken with some of these overelaborate chapters and the statistical summaries they contain lead one to expect some regional planning program for congested areas instead of a plea and plan for preserving the countryside and making it accessible to hikers and motorists.

Fundamentals of Structural Design

REVIEWED BY ROBINS FLEMING
American Bridge Company, New York City

STRESSES STATICALLY DETERMINED — By John Clayton Tracy, C.E., M.Am.Soc.C.E., Professor of Civil Engineering, Sheffield Scientific School of Yale University. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 8x11 in.; pp. 462; 445 illustrations. $6.

The need for another book on statically determined stresses will be questioned by many. The author's answer is clearly stated in the opening sentences of the preface: "This book is intended to give a thorough working knowledge of the theory of stresses in statically determined framed structures. Great pains have been taken to explain fundamental conceptions, principles and methods so clearly and completely that the student can master them easily and quickly by himself." In a page "To the Student" the author says, "Any textbook such as this, which is restricted to the fundamentals of the subject, will merely start you on your way." In the introduction he writes: "It is assumed that the student who is studying stresses either has had or will have courses in related subjects, such as engineering mechanics, mechanics of materials, structural drafting and structural design. Hence, except for the review of statics in Part I, the aim has been to confine this book strictly within the field of stresses in ordinary framed structures."

The book is divided into three parts: Statics," ten chapters; "Stresses Due to Dead Load," seven chapters; and "Stresses Due to Live Load," seven chapters. Each subject is treated in great detail. For example, in determining graphically the stresses in a six-panel truss with parallel chords five separate force polygons are drawn, one for each joint, before they are combined in the sixth and complete diagram. Again, two pages given to "Practical Suggestions for the Use of the Graphic Method" enter into detail as to instruments and materials to be used as well as precautions to be taken to insure accuracy. The reviewer recalls a structural engineer, a college graduate, who told him that he could not tell from his stress diagram which members took compression and which tension. Such will not be the case with the reader of "To Determine Whether a Member Is in Tension or Compression" (pp. 236-239).

A special feature of the book is the classification of all problems in statics and the corresponding problems in stresses into eight cases, with a standard solution for each case. One chapter is entitled "General Method of Attack." It is noted that the term lb.-ft. is used for moment instead of ft.-lb., and each figure has the same number as the page upon which it is found. A synopsis of the chapter is given at the beginning and "assignments" for the student at the close.

The reviewer has read with interest the portions in small type. Space will allow attention to be called to but one such section, that beginning "The Elimination of Worthless Refinements in Computations" and the statement following, "A result cannot be more accurate than the data from which it is obtained." (Writers on wind stresses please note!)

Whatever may be the textbook followed, an instructor of structural engineering will find in this book much material that he can use in the classroom. Professor Tracy has a keen sense of the difficulties met by the student. To all those who are obliged to study without aid from an instructor the book is especially commended. It is well adapted to the needs of draftsmen who have not had a technical education and wish to obtain a thorough elementary knowledge of stresses in structures.

Publications Received

GEOLOGY AND ENGINEERING FOR DAMS and Reservoirs is the title of Technical Publication 215 of the American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York City. It is a reprint of several papers presented at a symposium on the geology of dam sites held in New York in February, 1929, together with the oral and written discussions of the papers.

TWO REPRINTS on arc-welding design are available from the General Electric Company, Schenectady, N. Y. One reprint includes a paper on "Design of Joints for Welded Steel Structures," by Andrew Vogel, presented at the last annual meeting of the American Welding Society, giving in condensed form the important data which the General Electric Company has collected as a result of tests of 173 specimens of metallic arc welds. The other reprint, also by Mr. Vogel, treats of the same 173 test specimens but goes somewhat more into detail with regard to the tests themselves.

THE COMMERCE YEARBOOK FOR 1929, Vol. I of which has just been issued, presents a review of business in the United States at the highest level it has ever attained. The steadily increasing efficiency of both industry and trade is reflected in every page of this elaborate survey of business conditions. Discussions on the course of events in industry, agriculture, transportation and other branches of commerce are included, written by experts schooled in factual analysis. Statistical data incorporated in the volume were compiled from original sources, official and commercial, including the Bureau of Foreign and Domestic Commerce, the Census Bureau and the Bureau of Mines, of the Department of Commerce; the Bureau of Agricultural Economics, of the Department of Agriculture; the Federal Reserve Board, the Interstate Commerce Commission, the Shipping Board, and the Bureau of Labor Statistics, of the Department of Labor. Trade associations

have furnished data, in many cases, in advance of publication by them. Vol. I of the 1929 edition contains 670 pages, indexed, relating wholly to domestic business conditions. It may be obtained for $1 from the Superintendent of Documents, Washington, D. C. Vol. II, summarizing economic conditions in foreign countries, is being compiled and will be ready for publication about Oct. 1.

UNDERGROUND STORAGE of water, involving the retention of flood flows in surface reservoirs for later percolation and eventual utilization, has been thoroughly investigated and studied in connection with the San Gabriel basin in southern California. Methods used in working out from definite data the flow to, draft from and operation of an underground reservoir are reported in bulletin 7 of the San Gabriel investigation, written by Harold Conkling, chief of the California Division of Water Rights and published by the state Department of Public Works.

PROJECTIONS FOR WORLD MAPS are discussed by a number of authors in the April, 1929, issue of the *Monthly Weather Review*, just issued by the Weather Bureau, of the U. S. Department of Agriculture. Those discussed in detail are the dodecahedral projection, in which the earth's surface is projected upon twelve pentagonal surfaces; the orthogonal or equi-angular variant of the octahedral system, in which the surface of each hemisphere is projected upon a pyramid; and Goode's polar equal-area projection, based upon a mid-meridian for each continent which shifts at parallels of latitude so as to remain approximately at the center of the land mass.

NATIONAL STANDARDIZATION ACTIVITIES during the past year are reviewed in the 1929 Year Book of the American Standards Association of New York City. The review covers mechanical, electrical, building, transportation, mining, textile and many other industries. New standards completed include a code for the protection against lightning and specifications for track work for both steam and electric railways.

ACCOMPLISHMENTS of a well-organized industry with able leaders are reviewed in a 67-p. booklet, "High Lights of a Decade of Achievement," published by the National Lumber Manufacturers Association, Washington, D. C. While the review does not attempt to go into great detail, it tells in clear and readable style of the progress made and the service rendered by the association since its reorganization in 1918, and also something of its plans for the future.

New Books and Revised Editions

[*Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.*]

AERIAL NAVIGATION AND METEOROLOGY: A Comprehensive Treatise in Simple Language for the Student With an Average Education—By Capt. Lewis A. Yancey, Master Mariner Unlimited), Marine Surveyor, Nautical Counselor. Second revised and much enlarged edition. Contains numerous solved problems and examples for practice. New York: Norman W. Henley Publishing Co. Cloth; 6x9 in.; pp. 316; 102 engravings and colored plates. $4.

BIBLIOGRAPHY OF PETROLEUM AND ALLIED SUBSTANCES, 1922 and 1923—By H. Britton. Bulletin 290 of the Bureau of Mines, U. S. Department of Commerce. Washington: Government Printing Office. Paper; 6x9 in.; pp. 667. $1.

CALCIUM SULPHATE RETARDERS FOR PORTLAND CEMENT CLINKER—By Ernest E. Berger. Technical Paper 451, Bureau of Mines, U. S. Department of Commerce. Washington: Government Printing Office. Paper; 6x9 in.; pp. 35; 8 line cuts. 10c.

COMMERCIAL AND INDUSTRIAL ORGANIZATIONS OF THE UNITED STATES, 1929 Edition. Publication of the Domestic Commerce Division, Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce. Washington: Superintendent of Documents, or from any office of the Bureau of Foreign and Domestic Commerce. Cloth; pp. 272. 60c.

Lists more than 13,000 trade associations and non-profit commercial organizations classified by service and commodities.

COMPRESSIVE STRENGTH OF SLAG CONCRETE. Symposium No. 18 of the National Slag Association. Cleveland, Ohio: National Slag Association. Paper; 6x9 in.; pp. 51; 68 tables. 25c.

FACTORY DESIGN AND EQUIPMENT and Manufacture of Clay Wares—By T. W. Garve, Cer.E. First Edition. Indianapolis: T. A. Randall & Co., 211 Hudson St. Bound; 6x9 in.; pp. 304; 284 halftones and line cuts. $6.

FOREIGN TRADE ZONES (or Free Ports) Analyzed With Special Reference to the Advisability of Their Establishment in the United States. Prepared by the Board of Engineers for Rivers and Harbors, U. S. War Department, and the Bureau of Operations, U. S. Shipping Board. Washington: Government Printing Office. Paper; 6x9 in.; pp. 322; 71 halftones and line cuts. $1.

GROUNDWATER IN YELLOWSTONE AND TREASURE COUNTIES, MONTANA—By George M. Hall and C. S. Howard. Water Supply Paper 599, U. S. Geological Survey, Department of the Interior. Prepared in co-operation with the state engineer, the department of chemistry of the Montana State College and the water laboratory of the Montana State Board of Health. Washington: Government Printing Office. Paper; 6x9 in.; pp. 118; 11 halftones, 5 line cuts and one colored geologic map. 25c.

HOUSING PROBLEMS IN AMERICA: Proceedings of the Tenth National Conference on Housing, Philadelphia, Jan. 28-30, 1929. New York: National Housing Association. Cloth; 6x9 in.; pp. 355; line cuts.

INGENIEURGEOLOGIE—Von Dr. K. A. Redlich, o.o., Professor der Deutschen Techn. Hochschule Prag, Dr. K.v. Terzaghi, o.o., Professor des Institute of Technology, Cambridge, Mass., and Dr. R. Kampe, Direktor des Quellenamtes Karlsbad, Privat Dozent der Deutschen Techn. Hochschule, Prag, Wien and Berlin: Julius Springer. Bound; 7x10 in.; pp. 708; 417 illustrations. 57 reichs marks.

METHODS, COST AND SAFETY IN STRIPPING AND MINING Coal, Copper Ore, Iron Ore, Bauxite and Pebble Phosphate—By F. E. Cash and M. W. Von Bernewitz. Bulletin 298, Bureau of Mines, U. S. Department of Commerce. Washington: Government Printing Office. Paper; 6x9 in.; pp. 275; 120 halftones and line cuts. 70c.

MITTEILUNGEN DER DEUTSCHEN MATERIALPRÜFUNGSANSTALLEN: Sonderheft VII: Arbeiten aus dem Staatlichen Materialprüfungsamt zu Berlin-Dahlem. Berlin: Julius Springer. Paper; 8x12 in.; pp. 125; 113 illustrations. 19 marks.

Here are brought together some two dozen research papers previously published in various technical and scientific journals during the last three years. Most of them deal with cement and concrete. Tests of high-strength portland cements, identification of slag in cement, effects of trass, destructive effects of alkali waters and hydrogen sulphide, and an air elutriator are some of the subjects covered.

NUOVO METODO PRACTICO E TAVOLE per el Calcolo die Movimenti di Terra e Della Zone di Occupazione—Occurrenti Alla Construzione di Strade, Ferrovie e Canali—By G. Catto. Terino: S. Lattes & C., Librai della Real Casa. Paper; 5x7½ in.; pp. 245; 36 illustrations.

PORT AND TERMINAL CHARGES at United States Port—Prepared by the Board of Engineers for Rivers and Harbors, War Department, and the Bureau of Operations, U. S. Shipping Board. Paper; 6x9 in.; pp. 557; $1 from Superintendent of Documents, Government Printing Office, Washington, D. C.

THE PORTS OF TEXAS CITY AND CORPUS CHRISTI, TEX., Revised 1928. Port series No. 6, prepared by the Board of Engineers for Rivers and Harbors, U. S. War Department and the Bureau of Operations, U. S. Shipping Board. Washington: Government Printing Office. Paper; 6x9 in.; pp. 78; 4 halftones, 4 maps. 30c.

PRACTICAL MACHINE MINING—By M. D. Williams, F.G.S., Lecturer in Mining Engineering, formerly Colliery Manager, m. South Wales Inst. of Engrs., Nat. Assn. of Colliery Managers, part author of "Mining Drawing" and "Mining Sketches." New York: Oxford University Press. London: Humphrey Milford. Cloth; 6x9 in.; pp. 218; 148 illustrations. $5.

PROPERTIES AND MANUFACTURE OF CONCRETE BUILDING UNITS—By Frank A. Hitchcock, engineer, and John R. Dwyer, associate engineer, U. S. Bureau of Standards. Circular 304 of the Bureau of Standards, U. S. Department of Commerce. Paper; 7x10 in.; pp. 49; illustrated.

RAW MATERIALS OF INDUSTRIALISM—By Hugh B. Killough, Ph.D., Associate Professor of Economics, Brown University, and Lucy W. Killough, Ph.D., Assistant Professor of Economics, Wellesley College. Cloth; 6x9 in.; pp. 407; illustrations and tables. $3.75.

ROADSIDE DEVELOPMENT—By J. M. Bennett, Superintendent of Parks and Forestry, Board of County Road Commissioners, Wayne County, Mich. Land Economics Series, Edited by Richard T. Ely, Ph.D., LL.D., Director of the Institute for Research in Land Economics and Public Utilities, and Research Professor of Economics in Northwestern University. New York: The Macmillan Co. Cloth; 5½x8 in., pp. 268; many halftones and line cuts.* $5.

THE ST. LAWRENCE NAVIGATION AND POWER PROJECT—By Harold G. Moulton, Charles S. Morgan and Adah L. Lee. Washington, D. C.: The Brookings Institution. Cloth; 5½x8 in.; pp. 675. $4.

SAP STAINS OF WOOD AND THEIR PREVENTION—By Ernest E. Hubert, Professor of Forestry, School of Forestry, University of Idaho. Publication of the National Committee on Wood Utilization, U. S. Department of Commerce. Washington: Government Printing Office. Paper; 6x9 in.; pp. 77; 35 line cuts and halftones. 25c.

SEASONING, HANDLING AND CARE OF LUMBER (Manufacturers' Edition). Report of the Manufacturers' Sub-Committee on Seasoning, Handling and Care of Lumber of the National Committee of Wood Utilization, U. S. Department of Commerce. Washington: Government Printing Office. Paper; 6x9 in.; pp. 126; 63 halftones and line cuts. 30c.

THE STORY OF THE BALTIMORE & OHIO RAILROAD—1927-1929—Vols. I and II—By Edward Hungerford. New York: G. P. Putnam's Sons. London: The Knickerbocker Press. Cloth; 6½x9½ in.; pp. 372, Vol. I; pp. 365, Vol. II; both volumes profusely illustrated. $10.

THE STORY OF WATER SUPPLY (The City and Country Series)—By Hope Holway. With pictures by Elmer Hader. New York and London: Harper & Bros. Cloth; 5x8 in.; pp. 134; illustrated. $1.25.

Letters to the Editor

A Forum for Discussion of Views of Engineers and Contractors

Procedure in Pouring Building Columns

Sir—Section 507*b* of the American Concrete Institute code says: "Beams, girders, brackets, column capitals and haunches shall be considered as part of the floor system and shall be placed monolithically therewith."

A large number of contractors do not follow this rule, but pour the column capital in flat slab construction at the same time that the column is poured. The drop is then poured with the slab. They claim that it makes it easier to clean the top of the column and makes a better looking job.

Since this practice is directly contrary to the requirement of the code, either the code should be revised to agree with field practice or the code should be strictly enforced. If this one requirement is not adhered to, the code is not being enforced properly.

The A.C.I. informs me that a committee is investigating this question at the present time. SAUL UHR.

Philadelphia, Pa.,
July 22, 1929.

Safeguarding Grade Crossings

Sir—It is patent that the danger to life and property from unguarded railroad crossings is daily increasing in an even greater ratio than the increase in the number of automobiles in use. Safeguards at the more congested crossings have helped materially to avert accidents, but tend to slow up traffic instead of facilitating it. Grade separation, the only effective solution to the problem thus far devised, cannot be applied immediately to all crossings, owing to physical conditions or the expense involved, or both.

It was recently the writer's experience—or more appropriately his misfortune—to be a passenger on a motor bus which was struck and demolished at a grade crossing by a passenger train. Few have had the experience of observing the surroundings and conditions, as well as the impressions immediately preceding such a catastrophe, and of living afterward to study and analyze the attending factors, as well as to consider constructive suggestions which might, if carried out, tend to overcome such a condition under similar circumstances.

Apparently there were five causes contributing to this accident: (1) The crossing was not provided with lights, gates, watchman or bell. (2) It was raining slightly, and although broad daylight, the atmosphere was cloudy and depressing. (3) The driver of the bus made no effort to slacken its speed on approaching the crossing and apparently did not observe the approaching train until after some of the passengers had screamed a warning. (4) The approaching train was almost indistinguishable against the background of trees and other surroundings, owing to its dark color, which blended with the background. (5) As the train approached from the right of the bus, the engineer could not observe the latter except through the warnings of the fireman.

By taking up and analyzing these contributing factors we arrive at the following suggestions, which recommend themselves as inexpensive and effective assurance against such catastrophes:

1. Automatic bells or flashlights should be installed at all important crossings. The expense might be prorated between the railroads and the state, the latter's share being paid for out of the funds received from automobile licenses or from the proceeds of the gasoline tax.

2. Such lights or bells should be of sufficient brightness or loudness to be visible or audible under the most adverse weather conditions.

3. No matter how well a crossing might be protected as above outlined, there will be some individual drivers who will disregard the warning. For this class there seems to be no reasonable remedy. But for the motor bus carrying a load of human freight, a law should be passed making it a felony for the driver to fail to stop at all grade crossings, whether guarded or not; and in most cases two drivers should be insisted upon, one to operate while the other exercises every precaution for safety.

4. All locomotives and trains should be painted a bright, conspicuous color. This may seem ridiculous, but is offered as a forward step to meet modern requirements.

5. All locomotives should be equipped with devices, such as automatic stokers, which would relieve the fireman from the necessity of frequently leaving his seat of observation.

Much of the above may seem radical, but it is going to take some radical measures to meet the conditions, and both the railroad and public must contribute to the one end. It is the intention of this letter merely to offer some ideas gained from practical experience in the hope that they may form a nucleus from which something effective may be evolved.

Lima, Ohio, JOHN D. RAUCH,
May 17, 1929. Chief Engineer,
Ohio Power Shovel Company.

Claims Editors Are Prejudiced

Sir—A very large number of your readers would have more respect for your editorials and comments if you pursued a broad-gaged policy in what you say about waterways and transportation. There are too many conscientious, intelligent, thinking readers of your publication on whom you cannot force your prejudiced views and opinions about the subject of waterways and make them believe you. They are too sensible to accept your statements for what you think they are worth. They have their own opinions and just as firmly believe them as you do the propaganda you try to hand them.

You can command great respect from them if you will adopt a liberal policy and open your columns to a full and frank discussion of waterways from all viewpoints. Remember that you cater to a profession which relies on research to get its facts upon which to base its opinions and conclusions.

I refer to your recent editorials and comments on the Lakes-to-the-Gulf waterway, to your reports on the waterways section of the American Society of Civil Engineers, which met in Milwaukee recently, and to others of former dates.

Please be kind enough to publish in your columns the following, which outlines briefly the transportation problem in the Mississippi Valley states:

1. Because of the Panama Canal—a waterway—it is cheaper to ship from the Central states, like Illinois, which is distant 2,300 miles from the Pacific Coast, by rail, 900 miles east to the Atlantic Coast, thence by water via the Panama Canal to the Pacific Coast, an over-all distance of 6,800 miles, or three times the all-rail distance, and save from $200 to $1,000 per carload, depending upon the classification. Many industries have moved from the valley to the Atlantic Coast because of this condition.

2. The distance from Chicago, at the foot of the Great Lakes, to the Gulf is about 900 miles. The joint rail-water rate between these points is 20 per cent less than the all-rail rate. Freight goes by rail between Chicago and the Ohio River, a distance of 300 miles. It can then go by water 600 miles between the river and the Gulf. The freight charge is split half and half between the two carriers, but note that the water carries it twice as far for the same money as the rail does. The Federal Barge Line has proved that it can make profits on the business.

3. The handling charges at the port of New York amount to as much as the freight from New York to the Central states on many commodities.

If the Mississippi Valley states had the use of the St. Lawrence and the Lakes-to-the-Gulf waterways, it could save large fortunes on its freight bills and I dare say that if your paper were published in this region and you could save money by using the waterways for receiving and shipping commodities you use, you would not refuse to do so.

Ottawa, Ill., SUTTON VAN PELT,
July 26, 1929. Civil Engineer and Constructor.

Our comment on the waterways session at the Milwaukee meeting was a plea for fuller "discussion of waterways from all points of view."—EDITOR.

News of the Week

St. Paul Offers for Sale Its City Hall and Court House

The city of St. Paul, Minn., is offering for sale its city hall and court house building and site. A commission has been appointed to dispose of the property and erect a new $4,000,000 structure on another site as part of a $20,000,000 civic improvement program planned by the city.

The present city hall and court house building is on a plot covering an entire block, 300x335 ft., in the heart of the loop section of the city. Within two blocks are many of the best hotels and office buildings, theaters, hotels, retail stores, the financial district and the newspaper offices.

It is announced that plans for development by the purchaser will receive as much consideration as the price offered.

Bridge Division Authorized in Baltimore Highways Bureau

A new bridge division in the bureau of highways, Baltimore, has been authorized by the Board of Estimates and will begin to function as soon as it is organized. The bureau of highways, of which Nathan L. Smith is engineer, is a branch of the Department of Public Works. The department is headed by Charles F. Goob, chief engineer of the city.

The bridge division will handle all the projects involved in an estimated expenditure of $10,000,000. It will be headed by Herman F. Lucke, Jr., construction engineer on the staff of the chief engineer. Assisting him will be a designing engineer, Samuel M. Johnson; an associate civil engineer, a junior engineer and an inspector.

The great amount of bridge work now under construction and proposed has made the bureau necessary, Chief Engineer Goob said. The division will be called upon to check the designs and work of consulting engineers in charge of the bridges to be built by the Pennsylvania Railroad in connection with that company's plans to expend $22,500,000 on improvements in Baltimore in the near future.

Northeastern States Shaken by Minor Earth Tremors

A succession of minor earth tremors was experienced Aug. 12 between Ashtabula, Ohio, and Springfield, Mass., in a district bounded on the south by Pennsylvania and extending north into Ontario. Little damage was done, this being confined chiefly to broken windows except at Attica, N. Y., where a church wall collapsed and falling chimneys did some damage, and at Warsaw, N. Y., where a large industrial chimney was destroyed. The disturbance is attributed to a fault in the substrata between Lakes Erie and Ontario, in the vicinity of Lockport, N. Y.

Seismographs at Fordham University in New York City failed to record the tremors, it is reported.

Boeuf Floodway Suit to Go to Trial

On Aug. 14 Federal Judge Dawkins, at Monroe, La., overruled the government's motion to dismiss the application of a property holder for an injunction to restrain construction of the levees for the Boeuf floodway of the Mississippi River flood-control system. He ordered that the case go to trial on the merits of the issue. The case involves the government's intention under the Jadwin plan to construct the floodway without providing compensation for the lands within the floodway. The Presidential order of approval of the construction of this floodway, issued by President Coolidge on Jan. 10, 1929, provided for payment for levee rights-of-way but did not provide for payment for floodway lands.

Ogden Typhoid Cases Traced to Water Supply

More than a dozen cases of typhoid resulting in several deaths occurred early in July at Ogden, Utah, and were directly attributable to contamination of the city water supply, according to the preliminary report of Dr. T. B. Beatty, state health commissioner of Utah. The unchlorinated flow from Wheeler Creek, which is frequently used as an auxiliary supply during the summer months, is considered by the report to be the most probable source of contamination. The main supply of the city comes from artesian wells, and this was not affected.

Records show that rain fell on the Wheeler Creek watershed twice during the month of June; the usual practice is to discontinue use of the creek water temporarily after such occurrences. This measure of precaution is supposed to have been carried out on these two occasions, but Dr. Beatty calls attention to the significant fact that after each rain a distinct group of cases developed following an interval equal to the accepted incubation period.

Other possible sources of contamination are eliminated by the report. At the present time the creek water is chlorinated as it enters the supply main.

A. L. Dopmeyer, district engineer, U. S. Public Health Service, investigated conditions upon the request of the Utah State Board of Health.

NEW HIGHWAY BRIDGE AT GRAND' MERE, QUEBEC

On June 30, 1928, the new toll bridge over the St. Maurice River at Grand' Mere, Quebec, was officially opened to traffic, replacing a ferry. The bridge has a total length of 1,115 ft. and a suspended span of 948 ft. 10 in., the longest suspended span in Canada. Cables are 26 ft. c. to c. and the roadway is 18 ft. wide. Erection was carried on from the ice on the river during the past winter. The bridge was built by the city and province as a joint undertaking. Fraser, Brace Company, Ltd., Montreal, was the contractor and Robinson & Steinman, New York, were designing engineers for the contractors. P. L. Pratley, of Monsarrat & Pratley, Montreal, was consulting engineer for the city and province. A description of the bridge and the unusual type of cables used will be published at a later date.

Multiple Dwelling Law Upheld by New York's Highest Court

The New York State Court of Appeals on Aug. 8 handed down a decision sustaining the constitutionality of the multiple dwelling law, which supplants the old tenement house law for New York City. The new law is placed in the category of a health measure, subject to the police power of the state, and the effect of the decision is to declare such police power, as to such a measure, superior to the provisions of the city home rule law.

The multiple dwelling law among other things prohibits the erection of towers on apartment houses on the ground that they should not be permitted to blanket adjoining buildings from sunlight. It legalizes cooking in apartment hotels, at the same time requiring greater measures of safety in kitchenettes in that class of multiple dwellings. It lays down stricter rules regarding light and sanitation and elimination of fire hazards and provides regulations covering setbacks and courtyards which the proponents of the law maintain should enable builders and owners to produce better multiple buildings with practically the same amount of rentable space as under previous laws.

Plans for East Boston Vehicular Tunnel Being Prepared

Under authorization of the last state legislature, which made available $16,000,000 for the construction of a vehicular tunnel under Boston harbor, the Boston Transit Commission is proceeding rapidly with the completion of plans and estimates. A few minor adjustments relative to the location of terminals remain to be arranged. It is expected that final plans will be submitted to the War Department for approval in about two months and that construction will start early next year.

New Branch Railroads Planned in Montana

Application has been filed by the Great Northern Railway Company with the Interstate Commerce Commission for permission to extend its recently proposed 32-mile Richey-Hamblin line in Montana westward an additional 73 miles to Jordan, which is only 150 miles east of Lewistown. This would make the extension 105 miles in length, with an estimated cost of $3,000,000. Plans for the new line were filed in the form of an application to amend the original Richey extension proposal filed July 26, and noted in *Engineering News-Record*, Aug. 1, 1929, p. 191.

The Northern Pacific Railroad has filed an application with the Interstate Commerce Commission for authority to construct a 24-mile branch in eastern Montana extending from a connection with a new Northern Pacific branch near Woodrow, Mont., northerly in the direction of Bloomfield. The work involves an expenditure of $750,000 and construction, it is announced, would begin immediately after the application is granted.

FINAL CLOSURE OF COOPER RIVER BRIDGE

Although contracts for the Cooper River bridge at Charleston, S. C., called for completion Nov. 4, 1929, the structure was formally opened to traffic Aug. 8. The project, which cost $6,000,000, has a total length of 14,313 ft., including a cantilever span of 1,050 ft. across Cooper River (shown above) and another of 640 ft. across Town Creek, connected by a curved trestle 2,650 ft. long. Clearance heights of the two main spans are 160 and 130 ft., respectively. The roadway is 20 ft. from curb to curb, and is widened at the curves. The designers were Waddell & Hardesty, with C. K. Allen as resident engineer; the contractors the Foundation Company, New York City, and C. E. Hillyer, Jacksonville, Fla., on the substructure and the McClintic-Marshall Company, Pittsburgh, Pa., and the Virginia Bridge & Iron Company, Roanoke, Va., on the superstructure. Aviation beacons are placed on the tops of the cantilever towers.

Recent Transfers Ordered in Corps of Engineers

Recent army orders involve several changes in the Corps of Engineers. Lieut. Col. Elliot J. Dent is relieved from duty in the office of the Chief of Engineers, effective Sept. 1, and is ordered to Fort Humphreys, Va., for duty as executive officer of the Board of Engineer Equipment; Major Dabney O. Elliott, now attached to the office of the Chief of Engineers, in charge of the Engineer reproduction plant, has been ordered to St. Louis for duty as assistant to the president of the Mississippi River Commission; Major James J. Loving, former assistant engineer commissioner of the District of Columbia, is relieved from duty at Fort Leavenworth, Kan., and ordered to Washington for duty in the office of the Chief of Engineers as resident member of the River and Harbor Board of Engineers.

Other changes in the Corps of Engineers include: transfer of Capt. Carl R. Shaw from Fort Lawton, Wash., to Hawaii; Major John W. N. Schulz from Fort Lewis, Wash., to Chicago, and Capt. Francis G. Fitzpatrick from Hawaii to Vicksburg, Miss.

Safety Congress to Hold 125 Sessions at Chicago Meeting

Preliminary announcements of the National Safety Congress, which is to meet in Chicago Sept. 30 to Oct. 4, list a total of 354 speakers and 125 sessions. The construction section will hear an address of welcome by D. A. Garber, general manager of the Associated General Contractors, and a number of papers scheduled for presentation, including: "Mechanical Safeguards on Construction Equipment," by E. H. Lichtenberg, chief engineer, the Koehring Company, Milwaukee, Wis.; "Results Through Voluntary Co-operation on Accident Prevention in Construction," by W. G. Wheeler, executive secretary, Building Trades Employers Association, New York; "What Can Be Done by Individual Contractors on Accident Prevention," by J. W. Cowper, president, John W. Cowper, Inc., Buffalo, N. Y.; and "The Subcontractor's Viewpoint of Safety," by Alfred B. Rysdon, chairman, committee on accident prevention, National Association of Sheet Metal Contractors, Chicago.

Tennessee Highway Department Reorganized for Efficiency

Changes in the Tennessee State Highway Department for the sake of economy and efficiency have been announced by Commissioner Robert H. Baker. Instead of five divisions there will be four, one of the two at Nashville being dropped and the territory of all the divisions reallocated.

Four assistant engineers are named as follows: J. E. Moreland in charge of designs, rights-of-way, co-ordination of engineering surveys, roads and bridge plans, and all other matters pertaining to design and contracts; E. M. Turner, in charge of construction; F. W. Webster, in charge of maintenance, and C. W. Butts, in charge of a new division of personnel for a study of efficiency and technical employment.

Division headquarters will remain at Nashville, Jackson, Knoxville and Chattanooga.

A number of employees have been dropped and the saving on their salaries is $40,000, but Commissioner Baker says that they will be returned to the service as soon as the new departments learn their needs and reorganize with the least possible waste force.

New England Water Works Assn. to Meet Sept. 17-20

Portland, Me., is to be the scene of the 48th annual convention of the New England Water Works Association, which will open Sept. 17 and continue in session for four days. On the first day the members will be welcomed by Gov. W. T. Gardiner of Maine and officials of the city of Portland, following which the customary officers' reports will be presented and eleven committee reports received. The afternoon will be devoted to two papers on the Portland Water District, by James W. Graham, treasurer and general manager, and David E. Moulton, clerk and attorney of the district, and a third paper "Beauty in Water-Works Structures," by John Calvin Stevens, architect. In the evening two papers on color reduction will be presented by Caleb Mills Saville, Hartford, Conn., and H. W. Clark, of the Massachusetts Department of Public Health.

Sessions on the second day, Sept. 18, will be confined to the morning and evening, the afternoon being taken up with a clambake and excursion. Besides two additional committee reports, the program contains: "A Year's Experience With Automatic Chlorination at Concord, N. H.," by Percy Sanders, superintendent of water-works; "Typhoid Fever in Eastern United States," by Chester F. Drake, Pittsburgh, Pa.; "Tests of Large Meters in the Field," by R. E. Ferguson, Hersey Manufacturing Company; and "Experience With Diesel Engines in Water-Works Plants," by A. D. Couch, Community Water Service Company, New York City.

Other papers are to be given during the meeting by the following: William R. Conard, Conard & Buzby (testing gas-iron pipe); E. E. Lochridge, chief engineer, Springfield, Mass., water-works; H. W. Huy, general manager, Western New York Water Company (reconstruction of the Buffalo pumping station); Herbert E. Smith, Simplex Valve and Meter Company (making flow and pressure studies); Arthur E. Gorman, Wallace & Tiernan, Inc.; and Harold Watson, superintendent of the Newport, R. I., water-works.

United States Civil Service Examinations

The U. S. Civil Service Commission announces the following open competitive examinations to fill vacancies occurring in the Engineer department at large, War Department, and in positions requiring similar qualifications: principal hydro-electric engineer, $5,600 to $6,400; senior hydro-electric engineer, $3,200 to $3,700; hydro-electric engineer, $3,800 to $4,400; associate hydro-electric engineer, $3,200 to $3,700; assistant hydro-electric engineer, $2,600 to $3,100.

France Plans 65-Story Building in New York City

Construction of a $50,000,000 combined office and apartment hotel building in New York to house French interests is expected to begin this fall, according to an announcement by the French consul-general in that city and the Chanin Construction Company, Inc. The building will be erected by the Palais de France Corporation, controlled by the French government, on the block bounded by Broadway, Central Park West, 62nd and 63rd Sts.

LONG RAILWAY PLATFORM IN ENGLAND

With a length of 2,238 ft., the railway platform illustrated above has recently been completed for the London, Midland & Scottish Railway. It joins Exchange and Victoria Stations in Manchester, England, crossing the River Irwell. Three trains can be accommodated at one time.

RANDOM LINES

The Draftsman's Poem

By Elldee

To wander in Elysian fields,
Where balmy zephyrs—Dang this pen!—
Caress sweet Nature's golden yields—
It's picking up more fuzz again—
Midst moonrise pine and dappled erst,
With carefree joy, good will and—There!
No more in ink *you'll* be immersed!
'Raus mit! Get hence! *You* and your *hair!*

Lie on the floor, you scratchy freak!—
Ah, this is better—Hi, ho, hum!—
To spend a fortnight or a week—
Whoof!—How'd that thumb tack get my thumb?—
Where coral isles—Yes, three degrees,
Two hundred feet, six inches out—
And damsels fair, with dimpled knees—
Gee whiz! That's wrong! It is to shout!

Odds Higgins! Only 1, 8, 4!
Well, that must be correct, eftsnootz—
Oh, but to have the helibore,
To voyage to—Dodgast cube roots!—
Some sun-kissed, palm-fringed tropic strand
And—Golly Moses, that side view
Don't look as though 'twould ever stand!
It's wobbly as a noodle stew!

What joy to leave one's drawing board
And fly to where the sunset—Wow!
That T-square's warped like some old Ford
That's bucked a box car or a cow!—
Gleams crimson in a sapphire sky
And—*Crash!* Doggone that ancient stool!
Ow-itch! My tailboard and my eye!
Now where is that blamed two-foot rule!

Why Not Melt the Rocks?

One who uses the nom de plume "A Native New Englander" comes forward with the following comment:

> It is noted that your issue of Feb. 28 contains on p. 360 a description of a unique method of burning out stumps in preparing land for cultivation in the State of Washington. Now, if some genius could devise an equally facile method of melting down rocks, New England farming might come into its own. To one whose early home carried the title of "Rockville" the idea is appealing.

Bakery Engineers Again

The use of more dry milk in baking to increase the quality of the product and to boost sales was advocated by P. J. Shortt, representative of more than 40 dry-milk manufacturers in the East, at a meeting of the Portland Branch of the American Society of Bakery Engineers, held last night at the Multnomah Hotel.—*From the Portland Oregonian.*

WASHINGTON NOTES

By Paul Wooton
Washington Correspondent

Present Report on Potomac Power—I. C. C. Disclaims Control of Electric Railways

THE Federal Power Commission has received the report of the Chief of Engineers dealing with the applications for water-power rights on the Potomac near Washington. Although the commission did not make the full report public, it issued a statement to the effect that General Jadwin, who submitted the report, recommended the granting of a preliminary permit to the Potomac River Corporation, of Wilmington, Del., a Byllesby interest, "subject to certain provisions for the protection of navigation and park development." Other applicants are Steinman & Quick and the South Branch Power Company. The commission also has before it a report on the proposed development by the National Capital Park and Planning Commission. This report is known to be adverse. As the report is made in pursuance of an act of Congress, it may not be made public until it is officially submitted to that body.

Rise in Lake Levels Ended

From tentative reports on Great Lakes water levels for the month of July, it is indicated that the recent rise has come to an end, but that the waters are not receding. This is regarded as unusual, since it has been observed that in most years the levels begin to fall in July. It is believed by government engineers that the rise in the lake levels will have an important bearing in the coming negotiations with Canada on boundary waterways and diversions from the Great Lakes watershed.

Although it is not believed that Canada will be overanxious to indorse plans for a permanent diversion at Chicago in connection with the Illinois waterway project, it is pointed out that the Canadians themselves have been permitting activities that tend to increase the flow out of the Great Lakes. In this connection attention is called to the dredging by Canadian interests in the St. Clair River to obtain sand and gravel, which tends to increase the discharge from the upper lakes.

Motor-Truck Regulation

Active consideration of proposed legislation for federal regulation of motor vehicles operating in interstate commerce is in prospect at the regular session of Congress next December. Prior to that time the Interstate Commerce Commission will prepare for the congressional committees on interstate commerce a report on the Couzens and Parker bills, which contemplate regulation of interstate buses only. Agitation for federal regulation of interstate motor-truck lines as well as bus lines appears to be growing somewhat stronger. Judging by reports reaching Washington, the farmer has discovered an interest in the subject and apparently desires that regulation shall embrace both buses and trucks. It is this development that may nullify the attempt to put regulatory legislation through at the next session, as the National Automobile Chamber of Commerce remains firm in its opposition to regulation of truck operation.

California's Needs to Be Studied

President Hoover has announced that problems incident to the development of California's water resources and the proposed San Francisco Bay bridge, involving both the state and the federal government, will be exhaustively investigated by two commissions soon to be created. The first of these, which will be concerned with irrigation, flood control, navigation and power, will contain representatives appointed by the War Department, the Federal Power Commission and the Department of the Interior, in addition to several others to be appointed by the Governor of California.

Problems in connection with the San Francisco Bay bridge will be considered by a second commission, to which will be appointed two representatives from the navy, two from the army, one to be named by the city of San Francisco, one from the east side of the bay, one or two to be selected by the Governor and another to be named by the President. It is stated that the post last mentioned will be offered to Mark Requa.

Electric Railways Outside of I. C. C. Jurisdiction

That the Interstate Commerce Commission's jurisdiction does not extend to street suburban or interurban electric railways which are not operated as parts of a general steam railroad system is stated in a decision dismissing the application of the Cincinnati, Hamilton & Dayton Railway for authority to acquire and operate the properties of the Indiana, Columbus & Eastern Traction Company and the Lima-Toledo Railroad Company. The merger would result in a through system of urban and interurban electric railroads extending from Cincinnati to Columbus to Toledo. As now operated, the properties of the Cincinnati, Hamilton & Dayton and of the lines to be acquired come within these exceptions, and the mere combination of the properties for ownership and operation will not change their status, according to the commission.

The electric railway company did not contend that the commission had jurisdiction, but claimed that the commission should approve its application in order to protect it, as well as the purchasers of its securities, against doubts that might otherwise exist regarding the status of the proposed securities to be issued in connection with acquisition and operation of the other properties.

Brief News

The Contract for the erection of the new $2,100,000 custom house at Toronto, Canada, has been awarded to the Peter Lyall & Sons Construction Company, the firm which built the dominion houses of Parliament and is now building the new Confederation Block at Ottawa. The new Toronto building must be completed by Jan. 16, 1931.

In a Foreclosure Sale on July 29 the Central Vermont Railroad was sold for $22,000,000 to the Canadian National Railway Company, which also assumes $5,000,000 receiver's certificates and all other obligations of the receiver. A new company, the Central Vermont Railway, Inc., controlled by the Canadian National Railways, will operate the railroad.

Hydro-Electric Power will be available to the Irish Free State, it is expected, by next winter from the harnessing of the River Shannon. The work on the project has been completed and the river water was officially turned into a 6-mile canal by President Cosgrave on July 22. The development was described in detail in *Engineering News-Record*, April 7, 1927, p. 554.

Preliminary Borings testing the nature and depth of the rock along the course of the Triborough bridge in New York have been completed. Bedrock was struck in every case a short distance below the surface. Bids will not be considered until after the first regular meeting of the Board of Estimate in September, when action will be taken for the purchase of land for terminals.

A 1,000-Mile Railway is being planned on the island of Madagascar, off the east coast of Africa. Negotiations are being carried on by which the construction will be done by a German syndicate, as a part of the reparations payments.

Preliminary Work on the Hansakanal, which was to connect Hamburg with the Ruhr district of Germany, has been abandoned for lack of funds.

The Third South American Railway Congress will be held at Santiago, Chile, in December, 1929. At the same time it is planned to have an exhibition of railway materials and roadbuilding equipment suitable for the construction of feeder lines to railways in which American and European factories will be invited to exhibit their various products.

To Permit the construction of terminal yards for the Dorchester rapid transit extension which has been in construction for approximately five years the Department of Public Utilities of Massachusetts has ordered the discontinuance of the New York, New Haven & Hartford passenger and freight service on the remaining portions of the Shawmut branch between

Harrison Ave. Square and Mattapan. It is expected that this project will be completed by Jan. 1, 1930. The total cost of this third rail rapid transit extension is about $10,000,000.

SPECIAL ALLOY STEEL was used exclusively in the construction of a bridge over the Oder River, near Staaken, Germany, completed early this year, with the result that the new structure is 26 per cent lighter than the bridge which was replaced. The material, known as St 48 steel, contains silica and molybdenum.

HEARINGS on the suit of the United States against the State of Utah to acquire title to portions of the Colorado and Green rivers will be held in Washington starting Sept. 5 before Charles Warren as special master. Subsequent hearings are to be held in Los Angeles, Denver and Salt Lake City. The purpose of the suit is to determine the navigability of the portions of the rivers in question and thus to decide whether the United States or Utah has jurisdiction over certain oil and mineral lands.

AN AIRPORT about 4 miles west of Toronto is projected by a new company, Skyways, Ltd. It will be the first airport in Canada to be completely equipped as a night landing field. Runways 1,800 ft. long are being built.

EUROPE'S GREATEST water-power development is well under way in Switzerland. The highest dam on the Continent, 371 ft. high and 223 ft. across the base, is being built near Grimsell Pass, which unites the Rhone and Aare valleys. The project is expected to be completed in four years and will produce more than a third of a million horsepower.

ELECTRIFICATION of all railways in the Italian territory in the vicinity of Trieste, a total of 187 km., has been commenced by the Italian government. Negotiations have also been started with the Austrian government leading to the electrification of the Tauernbahn, the railway which connects Venice with Salzburg.

A SPECIAL EXAMINATION will be held by the Civil Service Commission to fill the vacancy that has existed in the position of fire marshal of the District of Columbia since Aug. 1. Applicants for the position must have either an engineering degree from a recognized school or its equivalent in actual experience, with a wide knowledge of modern fire prevention methods and prevention work in general. No date for the examination has yet been set.

A NATIONWIDE AIRPLANE express service which will deliver its consignments by motor truck direct from the landing fields is being formed by the National Air Transport and the Curtiss-Wright group, according to an announcement in the current *Sales Management* magazine. The Transcontinental Air Transport, a third major company, also is reported to be interested in the service. The eventual aim of the air express service, it is explained, is to co-ordinate with the existing Railway Express Agency, Inc., using the ground facilities of the latter's express offices and motor truck fleets to receive its consignments, transport them to the field and deliver from plane to consignee.

AN AUTOMOBILE HIGHWAY connecting the seacoast of Germany with the Mediterranean, preliminary plans for which have already been prepared, is receiving much popular support. The proposed road will have a length of about 970 miles and a width of 30 ft. It will pass near Hamburg and Frankfort in Germany, Basel in Switzerland and Milan and Genoa in Italy, crossing the Alps over the St. Gotthard Pass. A new alignment is planned which will avoid the congested parts of the cities. The costs are to be met by contributions from the governments concerned, banks, motor car and tire manufacturers and other industries affected, and by bonds to be sold in Europe and the United States.

Engineering Societies

CALENDAR

ANNUAL MEETINGS

AMERICAN ASSOCIATION OF ENGINEERS, Chicago; annual meeting, Mexico City, Aug. 26-28.

AMERICAN WELDING SOCIETY, New York; fall meeting, Cleveland, Ohio, Sept. 9-13.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Portland, Me., Sept. 16-18.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; fall meeting, Boston, Mass., Oct. 9-11.

Personal Notes

MORRIS R. SHERRERD, consulting engineer of the North Jersey District Water Supply Commission, has resigned to accept the position of engineer of the State Water Policy Commission. His resignation is effective Aug. 15. Mr. Sherrerd has been associated with the commission during construction of the Wanaque reservoir and aqueduct and also with the city of Newark.

RAY LINDSEY, of Kingfish, Okla., has been made maintenance engineer by the Oklahoma State Highway Commission, succeeding L. P. Bobo.

A. J. SCHAFMAYER, assistant chief engineer of sewers for the Board of Local Improvements, Chicago, has been appointed chief engineer for the board, in place of the late C. D. Hill.

J. E. THORBURN, Seattle engineer, who formerly handled all field work for the city health department, has become associated with the Moran Construction Company, Seattle.

W. D. CLARK, for seven years city engineer of Bakersfield, Calif., has been appointed city manager, succeeding the late James A. Ogden. J. B. HOLFELDER, assistant engineer, has been made city engineer.

ANDREW J. KEELEY, superintendent of construction for the East St. Louis (Ill.) Board of Education, has resigned, effective on Sept. 1.

CHARLES M. REPPERT, chief engineer of the Department of Public Works, Pittsburgh, Pa., is in Europe to inspect the sewage-disposal systems of manufacturing cities in England and sanitary works in cities along the Rhine, in Germany.

C. H. SPENCER, who has been employed on the Echo dam and other work in Utah since May, 1925, is now in Shoshone, Idaho, as division engineer on the Gooding division of the Minidoka project, which consists of the construction of a 70-mile canal.

CLIFTON RICE, for the past eighteen months assistant maintenance engineer of the Texas Highway Department, with headquarters in Austin, has been named to head the newly created Dallas division of the department.

HARLAN A. HUNT has succeeded W. E. Backes as city engineer of Peoria, Ill. Mr. Hunt was a resident engineer for the Illinois Highway Department from January, 1927, to November, 1928, when he entered private practice.

WILLIAM A. RAMMING and FRED BOEHNING have been appointed by the St. Louis (Mo.) Board of Public Service as temporary members of the Board of Engineers Examiners. They replace J. J. Kellogg and Frank Altman, who resigned recently.

Major EUGENE REIBOLD, chief United States engineer in the Buffalo (N. Y.) district, has been named to serve as a member of a committee of three which will review reports on the advisability and cost of deepening the channels of the Barge and Oswego canals to 14 ft.

FRANK M. GENTRY, formerly assistant to the mechanical engineer of the New York Edison Company and for many years principal assistant engineer with George A. Orrok, consulting engineer, has resigned from the New York Edison Company to join the staff of Lehman Bros., bankers, New York City.

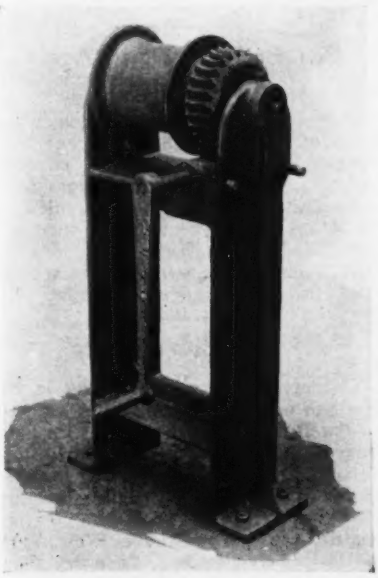
GEORGE K. HOOPER, former assistant city manager of Pasadena, Calif., under C. W. Koiner, has been appointed city engineer and superintendent of streets, according to announcement of R. V. Orbison, present Pasadena city manager. The appointment became effective Aug. 1. Mr. Hooper succeeds W. C. Earle.

JARVIS G. CLARKSON has accepted a position as designing engineer with Stevens & Wood, Inc., Jackson, Mich. Mr. Clarkson was formerly connected with the Commonwealth Power Corporation, of Jackson, but for the past year and a half has been in the service department of the American Association of Engineers in Chicago.

Construction Equipment and Materials

Floor-Type Hand Winch

Addition of a floor-type, hand-operated winch to its products has been announced by the Stephens-Adamson Manufacturing Company, Aurora, Ill. The winch is mounted on a cast-iron stand and operates through a cast-iron worm gear which is self-locking, insuring the safety of the load at all times. A rope pull of 750 lb. is developed at the drum, which is also of cast iron, 6 in. in diameter, and will carry 100 ft.



LIGHT WINCH OPERATED BY HAND

of ¼-in. cable or 60 ft. of ⅜-in. cable. Attachment to the floor is made by means of four bolts. Lubrication is by means of Alemite fittings.

Welding Current Supplied by Gasoline Motor Set

Developed especially for electric welding at points remote from a power supply, a new 300-amp. gasoline engine-driven single-operator arc-welding set recently announced combines the products of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and the Continental Motors Corporation. The electrical equipment consists of a Westinghouse type SK arc-welding generator with flexibly coupled exciter overhung from the generator bracket, which fits into the engine housing. The generator control panel is mounted on top of the generator frame. Current is varied by means of a single-dial rheostat. Protective covers over the complete equipment make it suitable for service under all weather conditions

GASOLINE-DRIVEN WELDING GENERATOR

without a canopy. Power is supplied by a Continental model P-35 four-cylinder gasoline engine with an S.A.E. rating of 28.9 hp. The entire unit can be made portable by the addition of running gears.

Heavy Truck for Roadbuilding

Designed especially for the heavy service found in highway construction, the model 627AW six-cylinder truck produced by the Indiana Truck Corporation, Marion, Ind., has a maximum gross allowance of 20,000 lb. and a rated pay load of 6,000 lb. With a wheelbase of 156¼ in., the length back of the driver's seat is 8 ft. 4 in. The dump body equipment recommended for this model is an 81-cu.ft. steel dump body with straight sides and round bottom, with double-acting tail gate and a center partition for batch work. The hydraulic under-body hoist attains a 55-deg. dumping angle. A feature of the truck is the patented Indiana three-point suspension mounting of motor, radiator and cab.

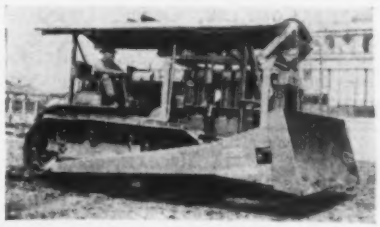
Motive power is provided by a Wis-

THREE-TON ROADBUILDERS' TRUCK

consin model H valve-in-head six-cylinder motor of 4-in. bore and 5-in. stroke, developing 72 hp. at 2,000 r.p.m. Ignition is by high-tension magneto. The transmission is mounted in a unit with the motor, and is of the selective sliding gear type with five speeds forward and two reverse. Power is conveyed to the rear wheels through a 2-ft. tubular propeller shaft and a full-floating, double reduction gear drive rear axle. Service brakes are of the vacuum booster type operating on the rear wheels; emergency brake on the propeller shaft.

Hydraulic Control on Tractor-Mounted Bulldozer

Adjustment of the blade of the Ateco hydraulic bulldozer is controlled by hydraulic power operating through a cylinder and piston rod attached to the central arm of a bell crank assembly which is connected with the blade of the bulldozer through chains. Power is secured from a pump driven by the take-off of the tractor through a special four-way valve. The machine, which is manufactured by the American Tractor Equipment Company, Oakland, Calif., can be adapted to any of the well-known makes of tractors. It is constructed of steel throughout, connections being made by electric welding. Attachment to the tractor is secured through a structural steel framework pivoted to the rear of the frame at a point where the rise and fall of the treads on rough ground will least affect the position of the blade. There is no interference with the draw-



BULLDOZER BLADE SHIFTED BY POWER

bar of the tractor, so that it can be uesd to pull other machinery without dismounting the bulldozer. When necessary, however, this can be done in a short time by disconnecting two pins locking the side arms and two clevis pins from the chain-hoisting mechanism.

Three Dead Air Spaces Provided by New Building Insulation

Wall insulation made of wood fiber board in an unusual form is being produced by the Triple Insulaire Company, Milwaukee, Wis. It is made in units 3 ft. long and of suitable widths to fit firmly between 16- and 24-in. studding centers. Each unit consists of a corrugated board folded in the center, with the two loose ends fastened together. The board is then scored so that on the job it can readily be forced into a section similar in appearance to a hollow I-beam. When inserted between the studding, three air spaces are provided: one in the center of the unit and one at each side between the flanges. The 3-ft. units are set vertically in the walls with horizontal header plates between the sections to prevent vertical circulation of air. The material of which Triple Insulaire is made is slow burning and contains silicate of soda, making it vermin proof and odorless. It is also treated to resist moisture.

Business Notes

EASTERN PAVING BRICK MANUFACTURERS ASSOCIATION has been amalgamated with the National Paving Brick Manufacturers Association. The Philadelphia office will be moved to Pittsburgh, Pa.

AMERICAN HOIST & DERRICK COMPANY, St. Paul, Minn., has opened a branch office in Detroit, Mich., in charge of G. J. Heck.

LONE STAR CEMENT COMPANY VIRGINIA, INC., on Aug. 10 closed for an indefinite period its mill at Norfolk, Va., and its raw material operations at Chuckatuck.

JEFFREY MANUFACTURING COMPANY, Columbus, Ohio, has elected H. Supp, Jr., formerly credit manager, to the post of treasurer, succeeding C. W. Miller, resigned. Mr. Miller continues as a member of the board of directors. J. X. Farrar, formerly assistant purchasing agent, succeeds Mr. Supp as credit manager.

GALION IRON WORKS & MANUFACTURING COMPANY, Galion, Ohio, has elected John L. Connors a member of the board of directors and has also appointed him assistant general manager.

LUTHER B. MACMILLAN, chief engineer of the Johns-Manville Corporation, died Aug. 10 in a Newark, N. J., hospital of injuries sustained when an airplane which he was piloting crashed near the Newark airport during the preceding night.

New Developments

Cableway Excavators — SAUERMAN BROS., INC., Chicago, Ill., has issued a completely revised catalog of Sauerman cableway excavators and power scrapers which gives data on costs of operation. The 55-p. booklet contains many illustrations, including a large number of typical layouts for various classes of excavation.

Cement Admixtures — JOHNS-MANVILLE CORPORATION, New York City, has issued a 24-p. illustrated circular, "Celite for Concrete," telling of the results obtained by the use of Celite. The illustrations show many projects of engineering interest.

Motor Sweepers — AUSTIN MANUFACTURING COMPANY, Chicago, Ill., in catalog 8 gives complete specifications of the Austin motor pick-up sweeper for street-cleaning purposes.

Excavating Machinery—NORTHWEST ENGINEERING COMPANY, Chicago, Ill., has published an unusually attractive catalog describing its crawler-equipped shovels, cranes, draglines, pull shovels and skimmer scoops. This contains 100 pages of text and is illustrated by half-tones, line cuts and a number of colored plates. About half the book is devoted to photographs showing equipment installations; the rest describes details of construction, with particular attention to well-known Northwest features, including the close-quarter crowd and the variable-speed accelerator-controlled motor. Clearance and dimension diagrams are given in great detail.

Electric Hoists—LIDGERWOOD MANUFACTURING COMPANY, Elizabeth, N. J., has issued a bulletin giving specifications of electric hoists developed especially for general contracting work.

Power Graders — W. A. RIDDELL COMPANY, Bucyrus, Ohio, is distributing a new folder describing models E and ER Warco power graders.

Welded Pipe—A. O. SMITH COMPANY, Milwaukee, Wis., in bulletin 505 describes the process of manufacturing SmithWelded pipe for oil and gas lines. Every step in manufacture is described, from the testing of the steel when first received to the loading of the finished pipe on the cars. In addition, the 52-p. book contains photographs of a number of existing pipe lines using this product and several pages of engineering data.

Roadbuilding Equipment — PIONEER GRAVEL EQUIPMENT MANUFACTURING COMPANY, Minneapolis, Minn., offers suggestions for selecting equipment to be used in building gravel roads, in an 80-p. illustrated catalog which describes screening and crushing plants, conveyors, screens and other equipment for the preparation of gravel for use. The assembly of separate units into a properly balanced plant receives particular attention.

Concrete Hardener—MASTER BUILDERS COMPANY, Cleveland, Ohio, has issued a 28-p. illustrated booklet, "The Fifth Ingredient," discussing the protection of concrete floors from wear and the disintegrating effect of acids and alkalis, even in mild form. The development of the new material "Omicron" is described, which reduces the ratio of soluble constituents in the concrete and also produces increased compressive and tensile strength. Further discussion is given in a separate pamphlet, "Reducing the Ratio of Valuable Constituents in Portland Cement Concrete," by Lewis B. Miller, director of research for the company.

Arc Welding—WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, East Pittsburgh, Pa., has issued a bulletin "Maintenance by the Electric Arc," touching upon the benefits possible from maintenance work by the electric arc-welding process. Eighteen illustrations show the possibilities of this process in the repair of railway equipment, dump buckets and heavy machinery of various kinds. Other recent bulletins of this company describe multiple-operator arc-welding equipment and direct-current generators for steam and internal combustion engine drive.

Construction, Labor and Material

Construction Equipment Exports Gain 12 Per Cent

Exports of construction and conveying machinery in the first half of this year are valued at $13,611,000, an increase of $1,439,000 over 1928. The principal items and the per cent changes from last year are as follows: excavation machinery, —3; conveying, +5; excavator parts and accessories, +14; elevators, +71; concrete mixers, +39.

Exports of all kinds totaled $2,324,680,000, a drop of 10 per cent. Crude materials except foods gained 11 per cent, the decline being in foodstuffs and manufactured products. Imports totaled $2,085,931,000, a drop of 9 per cent.

Cement Price Down Again in Cleveland

For the third time this summer the price of cement in Cleveland has been lowered 10c. The new price, effective Aug. 7, is $1.94. Other changes were a decline from $2.24 in June and from $2.14 in July. Previous to June the price had been $2.24 since January, 1927. The cuts are due to increasing competition from additional mills.

Living Costs Steady

Changes in the cost of living in the first half of 1929 in the 32 cities watched by the Bureau of Labor Statistics vary from a decline of 1.7 per cent in Boston, Atlanta and Birmingham to an increase of 0.5 in Cincinnati. In only six cities was the trend up, and these, except Seattle, are in the Middle West. For the last twelve months, 21 cities show increased costs.

E. N.-R. Index Numbers

Cost		Volume		
Aug. 1, 1929	**205.91**	**July,**	**1929**	**320**
July, 1, 1929	204.77	June,	1929	347
Aug. 1, 1928	207.29	July,	1928	266
Average, 1928	206.78	Average,	1928	287
Average, 1927	206.24	Average,	1927	263
1913.....	100.00	1913.....		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Aug. 15, with some comparisons, total as follows:

(In Thousands of Dollars)

	Aug. 15, 1929	Aug. 8, 1929	Aug. 16, 1928
Building:			
Industrial....	$2,866	$9,480	$4,714
Commercial...	22,579	26,580	35,023
Streets and roads.	6,964	10,906	5,661
Other eng. constr.	19,829	7,805	19,599
Total.....	$52,238	$54,771	$64,997
Total, all classes, Jan. 1 to Aug. 15:			
1929.....			$2,723,334
1928.....			2,249,070

CONSTRUCTION NEWS

Some of the Week's Large Projects

AMONG the announcements for the current week are the following:

Proposed Work

Manufacturing, Newark, N. J., Westinghouse Electric & Mfg. Co., New York, $8,000,000.

Store, Philadelphia, Pa., Rodman Wanamaker Est., W. N. Nevin, c/o John Wanamaker, plans by J. I. Windrim, Commonwealth Bldg., $5,000,000.

By-Products Plant, Gibsonton (mail Belle Vernon), Pa., Pittsburgh Steel Co., Pittsburgh, $3,000,000.

Exchange Buildings, New York, N. Y., New York Telephone Co., bids about Sept. 15, 111 x 184 ft., East 17th St., also soon lets contract, 10 story, 100 x 1,125 ft. West 50th St., $2,115,000 and $2,000,000 respectively.

Court House and City Hall, Windsor, Ont., City and Essex Co., sketches, $2,000,000.

City Hall, Schenectady, N. Y., City, C. Fugel, Mayor, take bids in Sept., $1,000,000.

Theatre, Chicago, Ill., United Theatres Corp., plans by Dyer & Nadherny, Chicago, $1,000,000.

Office, Newark, N. J., Fanning & Shaw, archts., Patterson, revising plans and taking bids about Aug. 15, $1,000,000.

Passenger Depot, Trenton, N. J., Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Phila., Pa., sketches, $1,000,000.

Machine Shop, Tube Mill addition, etc., New Kensington, Pa., Aluminum Co. of America, $1,000,000.

Refinery, Midland, Tex., Humble Oil & Refining Co., Houston, $1,000,000.

Airport, Alameda, Calif., Curtis Airports Corp., to exceed $1,000,000.

Exhibition Building, Toronto, Ont., Canadian National Exhibition, $1,000,000.

Bids Asked

Hospital, Massachusetts, Aug. 16, by Commonwealth of Mass., Dpt. Mental Diseases, Boston, $1,200,000.

Public Bond Elections, coming and decided, are listed on Construction News page 79.

Contracts Awarded

Subway, Brooklyn, N. Y., Bd. Transportation, J. H. Delaney, Chn., New York, general contract to Del Balso Constr. Co., New York, $4,654,052.

Airports, Valley Stream, N. Y., and Baltimore, Md., Curtis Airports Inc., New York, general contracts to Stone & Webster Inc., New York, $3,000,000 each.

Office, Philadelphia, Pa., Monarch Realty Co., R. Hyman and J. Greenberg, to Wark Co., Phila., $3,000,000.

Store, Chicago, Ill., Thielbar & Fugard, archts., Chicago, to McLennan Constr. Co. for Trustees System Discount Co., Chicago.

Hotel, New York, N. Y., Downtown Homes Inc., to J. H. Taylor Constr. Co., New York, $2,000,000.

Church, Washington, D. C., J. R. Pope, archt., New York, N. Y., to G. A. Fuller Co., Washington, D. C., for Disciples of Christ, $1,750,000.

School, Providence, R. I., City, general contract to B. Turgeon, New York, and others, totalling $1,159,615.

Hospital, Port Chester, N. Y., United Hospital of Port Chester to W. L. Crow Constr. Co., New York, $1,000,000.

Construction News of the Week

WATERWORKS

Proposed Work

Calif., Porterville—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

N. J., Spotswood—Boro plans mains, valves, hydrants in 18 streets. $90,000. R. P. Wilson, Highland Park, engr.

N. Y., Yonkers — Preliminary plans filter plant. $500,000. C. Sheridan, city engr. Maturity probably 1930.

Okla., Boise City—Preliminary plans extending water supply. $15,000. H. A. Warner, Amarillo, Tex., engr.

Okla., Frederick—Waterworks and sewer extensions. Benham Engr. Co., Perrine Bldg., Oklahoma City, consult. engrs.

Okla., Henryetta — Preliminary plans 8 in. high pressure water line and 10 in. gravity line to Pittsburg Plate Glass Co. plant. $18,000.

Okla., Meerker — Waterworks. To exceed $20,000. C. A. Wood, Stillwater, engr.

Okla., Mt. Park — Waterworks. $20,000. A. B Carson, Norman, engr.

Okla., Taloga — Preliminary plans waterworks. $25,000. Engineer not selected.

Tex., Edna—Surveys, waterworks. $35,000. W. M. Fooshee, Paris, engr.

Ont., Belleville — Soon takes bids concrete, brick, steel filtration plant, c.i. mains, valves, centrifugal pumps, electric motors. $200,000. Gore, Nasmith & Storrie, Confederation Life Bldg., Toronto, engrs.

Ont., Rockcliffe—Village, 1 mi. 6 and 10 in. c.i. mains, valves, hydrants, house connections, etc. $15,000. R. C. Harris, City Hall, Ottawa, engr.

Bids Asked

Calif., Anaheim—Aug. 22, by E. B. Merritt, city clk., 17,600 ft., 6- to 10-in. c.i. pipe, 16,000 lb. fittings. Noted Jan. 31.

Colo., Greeley—Aug. 20, by City Council, c/o W. A. Hamnett, city clk., riveted and welded steel pipe, c.i. water pipeline near here.

N. J., Newark—Sept. 10, by North Jersey Dist. Water Supply Comn., 24 Commerce St., headworks, incl. pumping station, aerator and structures, for Wanaque Aqueduct, at Wanaque Dam. M. R. Sherrerd, consult. engr. Fuller & McClintock, engrs.; adv. E. N.-R. Aug. 15.

N. Y., Brooklyn—Aug. 22, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, 72 in. bronze shaft cap and appurtenances in Castkill Tunnel Shaft 24.

N. Y., Cortland—Aug. 21, by Water Bd., additional rings to present stand pipe and erecting new stand pipe. J. R. French, clk.

Wis., Sheboygan — Aug. 27, by Bd. Water Comn., water filtration plant. Alvord, Burdick & Howson, 1417 Hartford Bldg., Chicago, Ill., engrs.

Contracts Awarded

Ark., Holly Grove — Comrs. Water Works, Impvt., water works, for town, to Harvey Improvement Co., Memphis, Tenn., $21,000. Noted July 18.

Ill., Springfield — Intake structure, screen house, to J. Sivie, Springfield, $19,800. Noted Aug. 1.

Mass., Weston (br. Boston)—Metcalf & Eddy, engrs., Statler Bldg., Boston, extending water mains, Contracts 6, 7 and 8, to R. H. White, 41 Central St., Auburn, Contr. 5 to J. H. McCusker, 82 Church St., Waltham, for Town. Noted July 11.

Mich., Detroit — Bd. Water Comrs., Water Board Bldg., two 24,000 volt 3-phase transformers for Connors Creek Storm Water Pumping Sta., Jefferson and Clairpointe Aves., to American Brown Boveri Co. Inc., 2847 Grand River Ave., $24,450. Noted July 18.

Mich., Royal Oak— R. B. Fleming, city clk., extending 17,400 lin.ft. 6 and 8 in. c.i. mains, to Lynchburg Foundry Co., Lynchburg, Va., at $44.66 per ton. Noted July 18.

Okla., Aline — Waterworks, to Bensen & Farrar, Guthrie, $28,765. Noted July 11.

THESE reports are grouped under each class (water-works, sewers, etc.) and under each stage of the work (proposed, bids asked, etc.) according to the alphabetical order of states.

Where name of official is not given inquiries should be addressed to City Clerk, County Clerk, or corresponding official.

SEWERS

Proposed Work

Calif., Los Angeles—Los Angeles Co. 12.22 mi. 8 and 10 in. cement, sewers, manholes, etc., Anaheim-Telegraph Rd. between Brannick St. and Downey Rd. To exceed $145,000.

Calif., Los Angeles—Los Angeles Co. 8- to 12-in. cement sewers, manholes in Bonnie Beach Pl. To exceed $95,000.

Calif., Los Angeles—Sewerage system, north of Alvarado St. between Avalon St. and point 518 ft. north. To exceed $25,000 or more. W. K. Knowlton, City Hall, engr.

Okla., Frederick — Preliminary plans outfall sewer line. $30,000. Benham Engr. Co., Perrine Bldg., Oklahoma City, engr.

Okla., Mt. Park—Sanitary sewerage system. $25,000. A. B. Carson, Norman, engr.

Okla., Oklahoma City—City Council soon takes bids storm sewers in Laird and Kate Avenues Dist. $400,000. Benham Engr. Co., Perrine Bldg., consult. engrs.

Okla., Taloga — Preliminary plans sanitary sewerage system. $25,000. Engineer not selected.

Tex., Cuero — City, plans sewerage system. $40,000 or more. H. Holland, 1109 McCullough Ave. San Antonio engr.

Ont., Grimsby—Town, 4 mi. vitr. tile sewers, rein.-con. activated sludge sewage disposal system, air compressors, clarifier motors, sluice gates. $100,000. F. A. Dallyn, 71 King St. W., Toronto, engrs.

Ont., North Bay—City soon takes bids 4,200 ft. 8 in. and up vitr. tile sewers in Trout Lake Rd. $30,000. F. G. Mackie, City Hall, engr.

Bids Asked

Miss., Booneville—See "Streets and Roads."

N. Y., Brooklyn—Aug. 23, by J. J. Byrne, pres. Brooklyn Boro, Boro Hall, sewers in Harbor View Terrace and Stanley Ave.

N. Y., Syracuse—Aug. 19, by Bd. Contr. & Supply, City Hall, storm and sanitary sewers, Salisbury Park, Colby Ave., Reen and Onwood Pls., Searlwyn and Barrington Rds. N. F. Pitts, Jr., city engr.

O., Miles Heights (br. Cleveland)—Aug. 19, by Village, sewers in Calhoun Rd. and 3 avenues. To exceed $25,000.

Contracts Awarded

Ark., Holly Grove — Comrs. Sewer Impvt. Dist., 1, R. Abramson, secy., sewerage system, to Harvey Improvement Co., Memphis, Tenn., $31,000. Noted July 18.

Calif., Glendale—For 31,352 ft. 8- and 10-in. sewer, in Broadview Dr., to J. Artukovich, 684 East 58th St., Los Angeles, $42,940. Noted July 25.

Calif., Woodland—City addition to sewerage system, to C. H. Prentiss Co., San Jose, $106,841.

La., Arcadia—City, 34,600 ft. tile sewerage system, disposal plant, to R. L. Myers Constr. Co., Hattiesburg, Miss. $35,268.

La., New Orleans—See "Materials."

Mass., Wakefield—Low level sewerage system in Water St. to Vernon St., $70,000. Owner builds. Noted Feb. 28.

See proposal advertising on page 133

Constr. News page 77

LEADITE

Trade Mark Registered U.S. Pat. Office

—Laying 48-in. c. i. pipe with LEADITE.

—Pouring 48-in. c. i. pipe joints with LEADITE.

Louisville, Ky. has used LEADITE for jointing 165.82 Miles of Water Mains

In fact, since 1923 the Louisville Water Co., Louisville, Kentucky has used LEADITE "exclusively" for jointing cast iron water mains varying in sizes up to and including 48", working pressures from 90 lb. per sq. inch down.

The reason why the Louisville Water Company has used LEADITE exclusively since 1923 is probably best explained in a recent letter from Mr. John Chambers, Chief Engineer and Superintendent, which reads in part as follows:

"These water mains have been in service six years and less and the joints are tight. Some of the lines were tested by the Pitometer Company of New York and no appreciable leakage was found."

"I consider LEADITE perfectly satisfactory as a joint material for cast iron bell and spigot pipe. The best that I can say for the material is that the Louisville Water Company intends to continue its use."

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
"Saves at least 75%"

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.

No Caulking

Sewers (Continued)

Mich., Huntington Woods—Village, 8 and 12 in. vitr. and concrete lateral sewers, to A. Carlesimo Co., 4236 Mitchell Ave., Detroit, $25,000. Noted July 25.

N. Y., Orangeburg — Dpt. Mental Hygiene, Capitol, Albany, sewage disposal system, outfall sewer, Rockland State Hospital, to Miller & Gaynor, 502 Church St., Poughkeepsie, $326,995. Noted July 11.

O., Cleveland—City, sewers in 7 streets in Metropolitan Golf Park Allotment, to Yahya Bros., 3333 Woodbridge Ave., $60,517. Noted July 18.

BRIDGES

Proposed Work

California — State Hy. Comn., Sacramento, steel truss bridge, on concrete piers, over Mojave River, San Bernardino Co., $140,000, C. H. Purcell, state hy. engr.

Calif., Oroville—Butte Co., to provide funds, widen bridges, $30,000. J. A. Bumgarner, co. surveyor.

Mass., Dorchester (sta. Boston)—City of Boston, Dpt. P. Wks., rein.-con., steel bridge over New York, New Haven & Hartford R. R., Morton St., $175,000. J. E. Carthy, City Hall, Boston, engr.

Mass., Taunton—City, A. J. McGraw, mayor, City Hall, concrete and steel bridge, Spring St., $25,000 or more.

Tex., San Antonio—City, preliminary plans concrete bridge, over San Antonio River, Travis St., $25,000. Hawley & Freese, c/o Frost Bldg., (flood prevention engrs.), and I. Ewig, city engr. Noted July 25.

Ontario and Quebec—Ontario Dpt. P. Wks., Ottawa, and Quebec Dpt. P. Wks., Quebec, soon take bids bridge between Hawkesbury, Ont. and Granville, Que., $600,000.

Bids Asked

California—Sept. 4, by Supvs. Yuba Co., Marysville, steel truss bridge, timber trestle approaches, over Bear River, for Yuba Co. (Marysville) and Sutter Co. (Yuba City) $60,000. W. Shearer, Yuba City, engr.

Maryland—Aug. 20, by State Hy. Comn., Baltimore, single 109 ft. span steel, concrete bridge over Baltimore-Ohio R.R. Contr. B-114, Baltimore Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.; adv. E. N.-R. Aug. 15.

Mass., Framingham — See "Contracts Awarded."

New Jersey—Aug. 26, by State Hy. Comn., Trenton, 3 bridges over Repaupo Creek, White Sluice Race and Sand Ditch, Route 44, Sect. 5, Gloucester Co. A. L. Grover, ch. clk.

New York—Aug. 20, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, stone faced rein.-con. bridge, Pleasantville Rd., Bronx Parkway extension. L. G. Holleran, acting ch. engr.; adv. E. N.-R. Aug. 15.

O., Cleveland—Aug. 28, by Comrs. Cuyahoga Co., rein.-con. steel bridge over Rocky River on Cedar Point Rd. $78,514. A. Felgate, Court House, engr.

Contracts Awarded

Calif., Los Angeles—Pacific Electric Ry. Co., E. C. Johnson, ch. engr., Pacific Electric Bldg., 2 concrete, steel bridges one 201 ft. over Los Angeles, other 180 ft., over Tujunga Wash., to Virginia Bridge & Iron Co., Metropolitan Theatre Bldg., $100,000. Noted July 25.

Calif., San Jose—City, 2 rein.-con., bridges, over Guadalupe River at Taylor St., and Hobson St., to J. D. Carlson, 235 Sierra St., $39,981.

Indiana—Comrs. Elkhart Co. (Goshen) and St. Joseph Co. (South Bend) rein.-con., arch bridge on County line, to Keith-Riley Constr. Co. Goshen, $157,420.

Indiana — State Hy. Comn., Indianapolis, 3 bridges, White Co., to W. H. Shons Co., 11 South Liberty St., Freeport, Ill. $32,583. 3 bridges, White and Pulaski Counties, to Kruzick Bros., Winamac, $21,187—one bridge, Daviess Co., to Watt Constr. Co., Winchester, Ill., $6,499—3 bridges, Gibson Co., to A. B. Krempp & Sons, Jasper, $27,890—2 bridges, Decatur Co., to H. Hicks, North Vernon, $29,116—bridge extension, Foundation Co., to R. McCalman, Inc., Danville, Ill. $80,248 — 2 bridges, Tippecanoe Co., to H. Tharp, Fountain City, $32,339. Grand total, $299,862. Noted July 18.

Iowa—State Hy. Comn., Ames, 18 culverts, extensions, Black Hawk Co., to T. B. Spencer Constr. Co., Waterloo, $4,025—14 in. Carroll Co., to W. E. Schoppe, Jefferson, $6,395—49 in. Dubuque Co., to F. Russell & Son, Waukon, $19,995—18 in. Pottawattamie Co., to F. O. Akin, Corning, $13,346—20 x 100 ft. high truss bridge, Carroll Co., to Mannes Constr. Co., Minneapolis, Minn., $13,495—13 box culvert extensions, raising 3 bridges Linn Co., to H. O. Graham, 807 Security Bldg., Cedar Rapids, $5,140—2 box culvert extensions, raising slab bridge Webster Co., to T. S. Powers, Fort Dodge, $1,178—3 box culvert extensions, Lucas Co., to E. A. Kramme Co., Des Moines, $955—9 x 20 ft. pony truss bridge with I-beam approach spans Pottawattamie Co., to Snyder & Johnson, Humboldt, $16,958. Grand total $81,487. Noted July 18.

Mass., Framingham — City, P. Wks. Dpt., Town Hall, 2 concrete slab and beam bridges, at 2nd and Irving Sts., day labor. Est. exceeds $25,000. B. Dyer, Town Hall, engr. Noted Mar. 21.

Michigan—C. L. Cowgill, resident engr., Plymouth, F. B. 1 of 63-20-3, C-2, Oakland Co., three 40 ft. steel deck girder spans, to R. B. Jackson Constr. Co., Jackson, for State Hy. Dpt., Lansing, $31,157. Noted June 13.

Michigan — H. C. Fleming, resident engr., Grand Rapids, M. B. 2 of 41-22-9, C-1, Kent Co., two 28 ft. and one 50 ft. spans steel deck girder, to Peninsula Const. Co., Grand Rapids, for State Hy. Dpt., Lansing, $26,203. Noted Aug. 1.

Michigan — G. D. Tramp, resident engr., Crystal Falls, F. B. 1 of 52-8-2, Contr. 3, Marquette Co., to Ferguson Constr. Co., Rockford, Ill., for State Hy. Dpt., Lansing, $44,205. Noted Aug. 1.

Pa., Harrisburg—Commonwealth, B. E. Taylor, secy. Properties & Supplies, Capitol Bldg., west Plaza Approaches memorial pylons, completing Soldiers and Sailors Memorial Bridge, Contr. 3, to McGraw Co., Commercial Trust Bldg., Phila., $745,392. Noted July 11.

Texas—G. Gilchrist, state hy. engr., Austin, rein.-con. drainage structures, Hy. 5, Grayson Co., to Womack-Henning Constr. Co., P. O. Box 664, Sherman, $23,927—Hy. 2, Tarrant Co., to Purvis & Bertram, 1124 West 9th St., Fort Worth, $46,224—rein.-con., steel, timber bridges on Hy. 73-A, Austin Co., to Davis-Pace Co., 1306½ Young St., Dallas, $56,304—rein.-con. bridges on Hy. 112, Karnes Co., to Gilstrap Constr. Co., Karnes City, $34,791—Hy. 3, Harris Co., to J. F. Buckner, 407 North Main St., Cleburne, $40,559—treated timber bridge, approaches, Hy. 19, Montgomery Co., to J. G. Donovan, Houston, $22,386—rein.-con. bridge Hy. 6, Ellis and Dallas Counties, to Williams, Oklahoma City, Okla., $43,945. Grand total $268,136. Noted July 25.

STREETS AND ROADS

Bids Asked

California—Aug. 28, by State Hy. Comrs., Sacramento, grading, asphaltic concrete paving 9.6 mi. Atascadero-Paso Robles Rd., San Luis Obispo Co.; concrete paving 0.6 mi. near Mt. Shasta, Siskiyou Co. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

Calif., San Diego—Aug. 26, by City Council, improving El Cerito H. T. S. 2, G. W. Jorgensen, City Hall, engr.

Calif., San Diego—Aug. 26, by Common Council, grading, curbing walks, paving Estelle St, H. W. Jorgensen, city engr.

Colorado—Aug. 19, by State Hy. Dpt., grading 14,500 cu.yd. roadway between Sterling and Ovid, Logan and Sedgwick Counties, L. D. Blauvelt, State Office Bldg., engr.

Ill., Niles Center—Aug. 20, by Village, concrete paving Greenleaf and Lakewood Aves, Consoer, Older & Quinlan, 222 North Wells St., Chicago, engrs.

Ia., Coon Rapids—Aug. 19, by Town, concrete paving 19,000 sq.yd. Capper Eng. Co., Adel, engrs.

Kansas — Aug. 21, by State Hy. Comn., Cimmaron, grading, culverts 5.474 mi. U. S. Rd. 50-N, F. A. 295-C, Hodgeman Co.; 22.84 mi. K-45, F. A. P. 416-A, Gray Co. W. V. Buck, Topeka, hy. engr.

La., Baton Rouge—Sept. 3, by Louisiana Hy. Comn., concrete paving 40.85 mi., Terrebonne, Grant, Richland, Beauregard, Vernon and Franklin Parishes. W. H. Norckauer, state hy. engr.; adv. E. N.-R. Aug. 12.

Maryland—Aug. 20, by State Roads Comn., Baltimore, concrete paving 1.8 mi. Contr. AA-71, Anne Arundel Co.—3.7 mi. Contr. K-40, and 3.7 Contr. K-41, Kent Co.—1.17 mi. Contr. S-35, Somerset Co.—concrete shoulders on 2.5 mi. Contr. Ho-64, Howard Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.; adv. E. N.-R. Aug. 15.

Md., Baltimore — Aug. 29, by Bd. Awards, concrete paving 12,400 sq.yd. Contr. 533; 11,635 sq.yd. Contr. 136. N. L. Smith, Municipal Office Bldg., hys. engr.

Massachusetts—Aug. 20, by Dpt. P. Wks., Boston, bituminous macadam paving 3,550 ft. Easthampton—3,243 ft. Wayland—1,500 ft. Holliston—rein.-con. paving 8,634 ft. Wilbraham. A. W. Dean, Dpt. P. Wks., engr.

Mass., Boston—Aug. 16, by Dpt. P. Wks., recut granite block paving in Ward 3, $25,000 or more. J. H. Sullivan, Dpt. P. Wks., engr.

Miss., Booneville—Aug. 20, by Mayor, grading, curbing, sewers, concrete paving 1,400 sq.yd. alleys; limestone rock asphalt paving 4,500 sq.yd. streets.

N. J., Paterson — Aug. 21, by Bd. Freeholders Passaic Co., Court House, grading, sheet asphalt on concrete paving Hamburg Turnpike, Sect. 2, Wayne. $150,000. G. Ferguson, Court House, co. engr.

N. Mex., Las Vegas—Aug. 19, at office City Clerk, grading, 6 in. concrete paving 2,600 sq.yd. T. V. Truder, mayor.

N. Y., Brooklyn—Aug. 23, by J. J. Byrne, pres. Brooklyn Boro, Boro Hall, grading, flagging Harway Ave., East 95th and East 43rd Sts.—granite on concrete paving North 14th St. —grading, asphalt block on concrete paving Albany Ave.—grading, curbing, asphalt on 6 in. concrete paving Linden Blvd., Rockaway Parkway, Avenue V, 17th Ave., East 27th, East 43rd Sts.

N. Y., Ithaca—Aug. 20, by State Educ. Dpt., F. P. Graves, comr., Education Bldg., concrete road and sidewalk, New York State College of Agriculture, adv. E. N.-R. Aug. 15.

N. Y., Long Island City—Aug. 20, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., grading, sidewalks on Junction Blvd., Onderdonk St., Jamaica, Clinton and 29th (Bayside) Aves.—grading, bituminous macadam paving Simonson Pl., Old Newton, and Horse Block Rds., 114th Ave. and 8th St., also outside railroad area from Van Wyck to Sutphin Blvds.—grading, sidewalks, sheet asphalt on concrete paving Hancock Pl., Vleight Rd., 161st St. and Caldwell Ave.

N. Y., New York—Aug. 22, by J. Miller, pres. Manhattan Boro, Municipal Bldg., laying, relaying sidewalks on York Ave. (Avenue A)—grading, granite block repaving St. Clair Pl., 12th Ave., Marginal, West 130th, West 131st, West 132nd Sts.—sheet asphalt on concrete paving extension of Seaman Ave.—widening Riverside Dr., at intersection of Dykman St.

N. Y., Northampton—Aug. 26, by Bd. Hudson River Regulating Dist., Albany plans grading, bituminous macadam paving 0.5 mi.; graveling 0.25 mi. and constructing 2 pier and west abutment of Northville Bridge. E. H. Sargent, ch. engr.; adv. E. N.-R. Aug. 15.

N. Y., St. George—Aug. 21, by J. A. Lynch, pres. Richmond Boro, Boro Hall, sidewalks on Forest and Washington Aves. — bituminous macadam paving Union Ave.—concrete curbing, vitr. brick guttering Carroll Pl.

O., Cleveland—Aug. 17, by Comrs. Cuyahoga Co., vitr. brick paving 20,800 cu.yd. St. Clair Rd. $143,100. F. Williams, Court House, engr.

O., Miles Heights (br. Cleveland)—Aug. 19, by Village, paving Ridgeton Rd. and East 167th St., sidewalks on East 174th St. and 4 roads.

Oklahoma—Aug. 21, by S. C. Boswell, state hy. engr., Capitol, Oklahoma City, grading, concrete paving 4.5 mi. Rogers Co.—grading, concrete paving, bridge, 0.323 mi. Beckham Co. —grading, drainage, bridge, 5.3 mi. Lincoln Co.—12.18 mi. Grady Co.—2.61 mi. Beckham Co.—11.45 mi. Washita Co.—4.54 mi. Okmulgee Co.—9.258 mi. Pushmataha Co.—11.77 mi. Caddo Co.—9.50 mi. Osage Co.—14.476 mi. Caddo Co.—8.001 mi. Jefferson Co.—2.5 mi. Muskogee Co.—grading, drainage, 1.8 mi. Woodward Co.—5.92 mi. Major Co.—1.46 mi. Okmulgee Co.—9.43 mi. Mayes Co.—14.28 mi. Caddo Co.—grading, bridge Kiowa Co.—bridge over Washita River, Caddo Co.

Okla., Beaver—Aug. 22, by G. Stephenson, city clk., grading, concrete paving 17,000 sq.yd. Main and Douglass Sts. $62,600. H. A. Warner, Amarillo, Tex., engr.

Pennsylvania—Aug. 29 and 30, by Dpt. Hys., Harrisburg, grading, rein.-con. macadam paving 88 mi. Berks, Butler, Chester, Clarion, Clearfield, Dauphin, Delaware, Elk, Franklin, Greene, Indiana, Lancaster, Lycoming, McKean, Mifflin, Montgomery, Montour, Northampton, Potter, Somerset, Sullivan, Washington, Westmoreland, York Counties; bridges in Crawford, Erie, Washington and Westmoreland Counties; adv. E. N.-R. Aug. 15.

Pa., South Coatesville—Aug. 29, by Boro Council, at office Boro Engineer, Bethlehem Steel Co. Bldg., improving 1st Ave. Contr. 6; adv. E. N.-R. Aug. 15.

Rhode Island — Aug. 21, by State Bd. P. Wks., Providence, paving 2.4 mi. Contr. 2911—1.45 mi. Contr. 2904—1.86 mi. Contr. 2905; adv. E. N.-R. Aug. 15.

Tennessee—Aug. 30, by State Dpt. Hys. & P. Wks., Nashville, grading 4.373 mi. Gainesboro-Roaring River Bridge Rd., State Hy. 85. Project 135-E Jackson Co.—10.105 mi. Dresden-Palmersville Rd., State Hy. 89, Project 331-D Weakley Co.—5.177 mi. Hamilton Co. Line-Dayton Rd., incl. bridge over 20 ft. span State Hy. 29, Project 353-F Rhea Co.—13.577 mi. Bolivar-Madison Co. line Rd., incl. bridge over 20 ft. span, State Hy. 18, Project 522-C Hardeman Co.—concrete, steel bridge over Stones River on Murfreesboro-Franklin Rd., State Hy. 96, Project 512-C, Rutherford Co. R. H. Baker, hy. comr.

Tex., Amarillo—Aug. 20, by J. W. Ryder, engr., Amarillo, 7,000 yd. Rydite paving or caliche and limestone surfacing 2,333 yd. road north of Fair Grounds, for City.

Virginia—Aug. 27, by Dpt. Hy., Richmond, macadam paving 2.5 mi. Loudoun Co.—soiling 5 mi. Halifax Co. $100,000.

Contracts Awarded

Ark., Conway — Grading, curbing, rein.-con. paving 13,989 sq.yd. Impvt. Dist. 16, to Ross & Dalton, Arkadelphia, $29,843.

Ark., Dermott—Asphaltic concrete paving 45 blocks, to T. H. Johnson Co., Dermott, $146,444.

Ark., Ft. Smith—S. A. Lynch, co. judge, Court House, grading, concrete paving 2.5 mi. Hendricks Blvd., and Free Ferry Rd., to West-Ark Constr. Co., $57,675.

Ark., Little Rock—Comrs. Subway & Street Impvt. Dist., paving, West 7th St., to Grady Garms, Rector Bldg., $81,200.

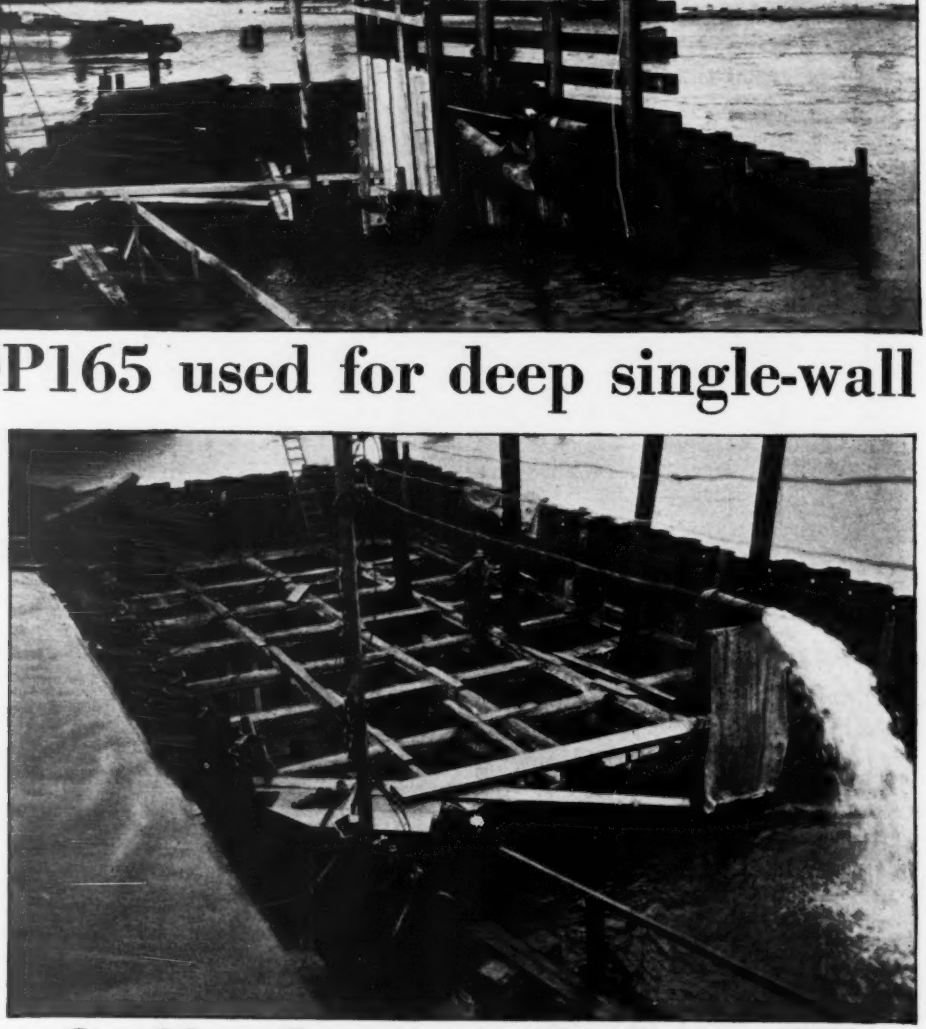
Ark., Springdale—Grading, curbing, concrete paving 9,950 sq.yd. Impvt. Dist. 7, to McEachin & Luke Constr. Co., Home Ins. Bldg., Little Rock, $21,977. Est. $25,000. Noted Mar. 28.

California — State Hy. Comn., Sacramento, grading, oil treated crushed stone surfacing 9.8 mi. Inyo Co., to F. Neighbert, Bakersfield, $111,920—1 mi. San Bernardino Co., to G. Herz Co., Platt Bldg., San Bernardino, $169,696.

Constr. News page 78

Lackawanna Deep Arch Piling

Section DP165 used for deep single-wall



Congress Construction Company, ***Chicago, Illinois,*** ***—Contractors***

Cofferdam at Pekin, Ill.

This 80 ft. x 40 ft. cofferdam was constructed in water 34 feet deep. The cofferdam was pumped out to a depth of 40 feet below water level. One 6-inch pump, in operation only half the time, kept the cofferdam dry.

Lackawanna Deep Arch Piling, section DP165, in lengths of 55 feet, was used on the job, this being the fourth time the contractors used this particular lot of piling.

The contractors commented upon the watertightness and the high transverse strength of this Deep Arch Piling Section. During the concreting, the top cross braces were removed so that the piling actually supported a 13-foot head of water in cantilever with apparently little or no deflection.

BETHLEHEM STEEL COMPANY

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District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

Bethlehem Steel Export Corporation, 25 Broadway, New York City
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BETHLEHEM

Streets and Roads (Continued)

California — State Hy. Comn., Sacramento, bituminous surface treating 6.9 mi. Nevada and Placer Counties, to Meyer Rosenberg, 41 Sutter St., San Francisco, $18,584; stock piling, screenings and crushed stone 13.6 mi. San Maeto, Santa Clara and Santa Cruz Counties, to Tieslau Bros., Berkeley, $18,245.

Calif., Long Beach—Grading, curbing, guttering, 6 in. concrete paving, 9th St., between Maine and American Aves., to Griffith Co., Railway Bldg., Los Angeles, $36,690.

Calif., Oceanside—Concrete paving 15,652 sq. yd. Toole Tract, constructing ornamental lighting system, to Miracle Constr. Co., 4751 Monroe St., San Diego, $110,000.

Calif., San Gabriel—Warrenite on asphaltic concrete paving 435,000 sq.ft. Live Oak St., to Hall-Johnson Co., 905 Westminister St., Alhambra, $96,725. Noted July 18.

Idaho—State Dept. P. Wks., Boise, crushed graveling 0.815 mi. Bonneville Co., to Sutherland & Burns, Constr. Co., Missoula, Mont. $26,133.

Illinois—State Hy. Dpt. Springfield, (S. means Section) paving S.571-W, Cook Co., to Arcole Constr. Co., Niles Center, $66,743—S.110—W, Cumberland Co., to D. W. Carnine, Sullivan, $7,536—S.31-X, LaSalle Co., to Breaden Bros. Constr. Co., Depue, $36,629—S.111-NW, Will Co., to Triangle Constr. Co., Kankakee, $7,763—S.85, Schuyler Co., to Hurden Constr. Co., Springfield, $12,319 — S.37-R, Cook Co., to Bway. Constr. Co., Chicago, $10,101 — S.123, Henry Co., to Central Engr. Co., Putnam Bldg., Davenport, Ia., $92,223—S.126-W, Knox Co., and grading S.101-SA, Effingham Co., to Cameron Joyce & Co., Keokuk, Ia., $22,343 and $8,243 respectively. Grand total, $262,899. Rejected bids bridge S.17B1, Alexander and Pulaski Counties.

Ill., Belleville—Bd. Local Impvts., rein.-con. paving 8,802 sq.yd. to A. P. Poirot, 721 East Washington St., $22,073—1,977 sq.yd., to Hoeffken Bros. Supply & Constr. Co., 222 West B St., $6,037—3,284 sq.yd., to B. A. Gundloch, 623 East Main St., $10,915—sewers to F. J. Reeb, 320 Centerville Ave., $912. Grand total $39,837.

Ill., Granite City — Grading, concrete paving 12 blocks Lincoln Avenue Paving Dist., to Tri City Paving Co., Granite City. Est. $72,000.

Ill., Lyons — Concrete paving 61,500 sq.yd. Ladd, Konrad, Maple and Hawthorne Aves., to W. T. Ryan, LaGrange, $245,340.

Iowa—State Hy. Comn., Ames, grading 1.238 mi. Butler Co., to J. W. Ault, Ft. Dodge, $9,061—4.941 mi. Mitchell Co., to J. Brown, Madison Lake, Minn., $10,135—graveling 3.1 mi. Jones Co., to Lanning & Fulkerson, Marion, $3,236—5 mi. Mahaska Co., to Harvey Sand & Gravel Co., Harvey, $7,350—5.26 mi. Benton Co. and 8.56 mi. Tama Co., to McDougall Constr. Co., Sioux City, $7,637 and $12,429 respectively—paving 9.672 mi. Audubon Co., to J. P. Abramson, 2902 Cottage Grove Ave., Des Moines, $179,054—0.388 mi. Boone Co., to Booth & Olson, Inc., Sioux City, $162,214—0.744 mi. Winneshiek Co., to Bemis & Schlick, 503 South Surety St., Des Moines, $23,697—6.749 mi. Pottawattamie Co. and 9.843 mi. Shelby Co., to Moran Constr. Co., 2341 Ellison Ave., Omaha, Neb., $151,791 and $226,088 respectively. Grand total $792,692. Noted July 18.

Ia., Dubuque—Concrete paving Central Ave. W., to J. F. Lee Paving Co., 406 Almond St., $86,146; Saunders, Pine St. et al., to Ulrich-Paley Co., 422 Garfield Ave., $8,155.

Ia., Fairfield—F. W. Goodman, clk., 6 or 7 in. rein.-con., or 2½ in. brick on 4 or 5 in. concrete paving 8,000 cu.yd. Stone, F and 5th Sts., to C. H. Kearns, Fairfield, $17,300.

Ia., Newton—To Lanning Constr. Co., Newton, grading South 5th Ave. E., East 5th St. S., East 9th St. N., North 8th Ave. E., at $0.454, $0.55 and $0.65 per sq.yd.—graveling East 12th St. S., East 10th St., North 10th Ave. E, East 9th St. N. at $2.67 per sq.yd.—concrete paving North 3rd Ave. E., 12th St. N. and 1st Ave. E., at $2.55 per sq.yd.

Kansas — State Hy. Comn., Court House, Mound City, concrete paving 5.445 mi. Linn Co., and 2.989 mi. Miami Co., to J. A. Tobin Constr. Co., Kansas City, Mo., $142,269 and $71,527 respectively—grading, culverts 7.1 mi. Cherokee Co., to Maxwell Constr. Co., Columbus, $54,407—2.676 mi. Allen Co., to Independent Constr. Co., Pittsburg, Kan., $31,599. Grand total $299,802.

Kan., Kansas City—Wyandotte Co., shoulders, concrete paving 2 mi. J. T. Gunter Rd., 18 ft., to H. C. Botsford, 650 West 69th St., $62,283.

La., Bogalusa — State Hy. Comn., Baton Rouge, paving 5 mi. streets, here, Washington Parish, to Barber Bros., Jackson and Baton Rouge, $103,274.

La., New Orleans—Rein.-con. paving 3,343 ft. North Rampart St., 27 ft., to Globe Constr. Co., Louisiana Bldg., $40,323. Noted Mar. 28.

Maryland—State Roads Comn., Baltimore, concrete paving 1 mi. Baltimore Co., to P. Reddington & Sons, 2 East Lexington St., Baltimore, $19,323; 3.3 mi. Kent Co., to P. D. Phillips & Bro., Salisbury, $49,568. Noted July 25.

Maryland—State Roads Comn. Baltimore, concrete paving 1 mi. Carroll Co., to Thomas, Benneti & Hunter, Westminster, $24,470. Noted June 6.

Maryland—State Roads Comn., Baltimore, concrete paving 1.05 mi. Prince George Co., to Southern Maryland Contg. Co., 14 East Lexington St., Baltimore, $24,960. Noted June 20.

Maryland—State Roads Comn., Baltimore, concrete paving 1 mi. Dorchester Co., to P. D. Phillips & Bro., Salisbury, $20,346. Noted June 13.

Maryland — State Roads Comn., Baltimore, concrete paving 6 mi. Anne Arundel Co., to Roberts Paving Co., Salisbury, $164,087. Noted July 11.

Maryland — State Roads Comn., Baltimore, grading 5.5 mi. Washington Co., to Cumberland Contg. Co., Cumberland, $36,252. Noted July 18.

Maryland — State Roads Comn., Baltimore, concrete paving 3.2 mi. Contr. M-123, Montgomery Co., to Thomas, Bennett & Hunter, Westminster, $70,968 1 mi. Contr. Q-46, Queen Annes Co., to Layfield & Waller Paving Co., Salisbury, $14,956.

Md., Baltimore—Bd. Awards, concrete paving 12,100 sq.yd. to Arundel Contg. Co., Knickerbocker Bldg., $27,846. Noted July 25.

Massachusetts—Dpt. P. Wks., State House, Boston, gravel, bituminous macadam paving 4,900 ft. hy., Bellingham, to W. H. Hinman, Inc., Medway, $13,603. This corrects report in Aug. 8 issue.

Mass., Boston—Dpt. P. Wks., sheet asphalt paving Burgoyne St., Ward 16, to D. M. Briggs & Co., 60 Marsh St., Dorchester. Est. $25,000 or more. Noted July 18.

Michigan—R. A. Beers, resident engr., Kalamazoo, concrete paving 1.018 mi. Kalamazoo Co., 40 ft., to W. H. Friedrich, Coldwater, for State Hy. Dpt., Lansing, $58,011.

Michigan—E. R. Benkert, resident engr., Port Huron, concrete paving 1.814 mi. Tuscola Co., to C. Schwensberg, Bay City, for State Hy. Dpt., Lansing, $74,843. Noted July 18.

Michigan — E. D. Crandall, resident engr., Cadillac, concrete paving 2.079 mi. Antrim Co., and 1.844 mi. Charlevoix Co., to R. F. Sloan, Jr., Battle Creek, $61,232 and $57,327 respectively, incl. cement, for State Hy. Dpt., Lansing. Noted July 4.

Michigan — E. D. Crandall, resident engr., Cadillac, graveling 6.945 mi. Leelanau Co., to Leelanau Co. Road Comn., Suttons Bay, for State Hy. Dpt., Lansing, $135,054.

Michigan — H. C. Fleming, resident engr., Grand Rapids, concrete paving 2.716 mi. Kent Co., to J. R. Edelman, Muskegon, for State Hy. Dpt., Lansing, $194,398. Noted July 18.

Michigan—G. H. Green, resident engr., Alpena, concrete paving 2.957 mi. Arenac Co., 20 ft., to Hillding Constr. Co., Omer, for State Hy. Dpt., Lansing, $85,540 and $35,503 respectively, incl. cement. Noted June 20.

Michigan — A. R. Schaefer, resident engr., Newberry, concrete paving 4.276 mi. Chippewa Co., 20 ft., to Marsman & Tabor, Grand Rapids, for State Hy. Dpt., Lansing, $176,607. Noted July 4.

Michigan — A. R. Schaefer, resident engr., Newberry, concrete paving 7.164 mi. Mackinac Co., to Rogers Constr. Co., Petoskey, for State Hy. Dpt., Lansing, $337,056. Noted July 18.

Mich., Dearborn — Concrete curbing, one course 8 in. concrete paving 15,000 sq.yd. Rosalie and Adeline Aves., to Otis Cement Constr. Co., 2956 Penobscot Bldg., Detroit, $32,770.

Mich., Detroit—Stone curbing, 3½ in. sheet asphalt on 8 in. concrete paving Marlowe and Lauder Aves., to Cooke Asphalt Paving Co., 1216 Penobscot Bldg., $96,199—4 avenues, to Cleveland Trinidad Paving Co., 402 Hammond Bldg., $83,141—Heyden Ave. and Vigo St., to Detroit Asphalt Paving Co., 909 Transportation Bldg., $32,565. Grand total $211,905.

Mich., Pontiac—Concrete curbing, one course 8 in. concrete paving 71,290 sq.yd., also 12,150 sq.yd. 4 in. sidewalks, to Bartling & Dull, Dixie Hy., $149,700.

Miss., Laurel—Grading 11.75 mi., to Bonnie Constr. Co., Mississippi Drug Bldg., $25,137.

Miss., McComb—For 2 in. asphaltic concrete on 5 in. concrete paving Northwest and Michigan Aves., to Merrill Eng. & Constr. Co., Jackson, $12,358 and $4,080 respectively; sewer pipe, to General Equipment Co., McComb, $1,306. Grand total, $17,744. Noted June 27.

Nevada—S. C. Durkee, state hy. engr., Carson City, grading, surfacing 17.5 mi. White Pine Co., to Bell Constr. Co., Carson City, for State Hy. Comn., Reno, $71,975.

N. D., Mandan—Grading, curbing, concrete paving 14 blocks east end, to Haggart Constr. Co., 214 Roberts St., Fargo, $50,741.

N. Y., Rochester—Asphalt paving State St. to Whitemore, Rauber & Vicinus Co., 51 Griffith St., Rochester, $92,632; and Mount Hope Ave. to Rochester Willite Corp., Exchange Bank Bldg., $41,712.

O., Alliance—Bd. Control paving South Liberty Ave., to C. Biers, Alliance, $76,500. Noted Mar. 14.

Oklahoma—State Hy. Dpt. Oklahoma City, concrete or brick paving 9.98 mi. Seminole Co., to Ward Beekman & Co., 4401 Classen St., Oklahoma City, $143,497—concrete or asphalt paving 5 mi. Beekman Co., to Standard Paving Co., 2119 East 11th St., Tulsa, $85,203—concrete slab paving 10 mi. Payne Co., to T. Collins, Cushing, $162,266—6.065 mi. Osage Co., to Roy Tanner & Co., Nebraska Bldg., Tulsa, $88,364—16.053 mi. Payne Co., to Ellis & Lewis, 507 Surety Bldg., Muskogee, $251,269—14.249 mi. Lincoln Co., to H. L. Carmady & Co., 1122 South Lewis St., Tulsa, $243,145—4.221 mi. Muskogee Co., to Locher Bros., Okmulgee, $65,684—4 mi. Washington Co., to Hamilton Constr. Co., Bartlesville, $65,820—6.81 mi. Pawnee Co., to Highway Constr. Co., Daniels Bldg., Tulsa, $106,325. Grand total, $1,211,473. Noted July 25.

Okla., Wawoka—Asphalt paving 16,450 sq.yd. Rd. 5 and 23,565 sq.yd. Rd. 8, Seminole Co., to Ward Beekman Co., 44011 Classen St., Oklahoma City, $37,921 and $57,809 respectively.

Tenn., Memphis — Approaches to Harahan Bridge over Mississippi River, to C. G. Kershaw Constr. Co., Woodward Bldg., Birmingham, Ala., $64,000.

Virginia — State Hy., Richmond, grading, grubbing, crushed stone surfacing, 77,353 sq.yd., Washington Co., to Calhoun & Sproles, Clinchport, $151,849—rock asphalt, paving 1 mi. Shenandoah Co., to Brady Bros., Frostburg, Md., $39,980—macadam paving 0.904 mi. Augusta Co., to Carpenter, Major Bros. & Co., Inc., Clifton Forge, $41,130. Grand total $233,959. Noted July 18.

Ont., Islington — Etobicoke Twp., concrete sidewalks, to Ramsay Contg. Co., 30 Indian Rd., Toronto, $10,890—to L. P. Acri, 28 Grove Ave., $10,536—to Toronto Cement Finishing Co., 24 Royce Ave., Toronto, $13,139. Grand total $34,565.

Ont., Sandwich—Concrete and asphalt paving 3 streets, to S. P. West, Detroit St., $56,614; Manchester and Matchett Rds., to H. I. Bondy, 31 Bridge Ave., Windsor, $8,343.

Ont., Toronto — Scarborough Twp., asphalt paving Warden Ave. and Fallingbrook Rd., to Rayner Constr. Co., Commerce and Transportation Bldg., $45,488; Dodge Rd., Tonson Blvd., Kenny and Parkin Aves., to Semone Constr. Co., 2074 Dufferin St., $10,060.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

Proposed Work

Calif., Porterville—Tulare Lake Basin Water Dist., permit approved, canals, weirs, levees, cleaning channel of Kings River for water supply, $1,600,000. Engr. dept. of owner.

Bids Asked

Ark., Jonesboro — Aug. 24, by Bd. Comrs. D. D. 31, Craighead Co., at office G. W. Cobb, dist. engr., Amer. Trust Bldg., 3 ditches, 106,600 cu.yd. excav.

Contracts Awarded

N. Y., Albany — F. D. Roosevelt, gov. and ch. State Office & Sites Building Com., Executive Chamber, Capitol, retaining wall for State Office Building, to A. Holcombe, 261 Clinton Ave., $5,445. Noted July 18.

N. Y., Booklyn—Bd. Transportation, J. H. Delaney, chn., 49 Lafayette St., retaining walls, fences, drains, Route 8, to P. K. Kelly Contg. Co., 6009 Woodside Ave., Woodside, $27,974.

Ont., Hamilton—S. E. O'Brien, secy. Dpt. P. Wks., Ottawa, 280,000 cu.yd. dredging in Hamilton Bay, to R. C. Hoffman Constr. Co., 331 Bay St., Toronto, at $27.8 per cu.yd. Noted July 25.

Ont., Prescott — Dominion Govt., Ottawa, dredging, removing 78,000 cu.yd. stone in Upper St. Lawrence River, to J. P. Porter & Sons Ltd., St. Catharines, at $3.89 per cu.yd., total $301,420.

Que., Sorel—S. E. O'Brien, secy. Dpt. P. Wks., Ottawa, Ont., dredging Lanctot Basin, to Les Chantiers Maureau Ltd., Sorel, $33,024.

Public Bond Elections

Coming Bond Elections

Waterworks and Sewers—Fletcher, Okla., Aug. 27, $58,000.
Waterworks — Tecumseh, Okla., Aug. 20, $151,000.
Waterworks and Sewers — Bracketville, Tex., Sept. 3, $90,000.
Waterworks and Sewerage System—Marshall, Tex., Aug. 20, $75,000.
Sewers—Lawrenceburg, Miss., Oct. 4, $125,000.
Sewerage System—Edna, Tex., $40,000.
Bridge — Newaha County, Neb., Aug. 27, $150,000.
Bridge — Richardson County, Neb., Aug. 20, $250,000.
City Hall—Pampa, Tex., Aug. 20, $238,000.
Parks—Tulsa, Okla., $300,000.

Bonds Voted

Waterworks and Sewers — Hattiesburg, Miss., $750,000.
Waterworks—Tipton, Okla., $15,000.
Waterworks—London, Tenn., $85,000.
Sewers—Hooker, Okla., Benham Engr. Co., Oklahoma City, Engr., $54,800.
Airports—Oklahoma City, Okla., W. W. Small, City Engr., $425,000.
Power Plant—Jackson, Tenn., $750,000.

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INDEPENDENT Reinforced Concrete Pipe ready for building a new sewer in Beardstown, Ills.

Illinois Cities Select this Pipe—Repeatedly!

THE repeated selection of INDEPENDENT Reinforced Concrete Pipe for important storm and sanitary sewers built by a long list of Illinois cities is another example of the outstanding recognition which municipalities in a long list of states give to "The Permanent Pipe with the Recessed Joint."

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FEDERAL GOVERNMENT

Proposed Work

Del., Wilmington—DREDGING—U. S. Engineer Office plans 22,500 cu.yd. dredging in Muderkill River.

Louisiana—LEVEE—U. S. Engineer Office, Vicksburg, Miss., 1,430,000 cu.yd. levee work from near Terry to Oak Grove.

La., New Orleans—LEVEE—U. S. Engineer Office 1,080,000 cu.yd. levee work at south bank, Sandy Bayou, Latamie Co., and 1,880,000 cu.yd. in Atchafalaya Floodway.

Mo., Kansas City—DIKES—U. S. Engineer Office, 2,500 lin.ft. dikes in Camden Bend. Noted Mar. 21.

Mo., Kansas City—DIKES—U. S. Engineer Office, plans 2,975 lin.ft. pile clump dikes, in Missouri River.

N. J., Lake Denmark—MAGAZINE—Spec. 5813—Bureau Yards & Docks, Navy Dpt., Wash. D. C. plans 6 magazines buildings at Naval Ammunition Depot.

Tenn., Memphis—LEVEE—U. S. Engineer Office plans 176,000 cu.yd. levee, in White River Dist.

Tex., Galveston—LEVEE—U. S. Engineer Office 566,600 cu.yd. levee work in Brazos River, Velasco and Lake Johnson; also dredging 886,000 cu.yd. under Sect. 1 and 1,814,000 cu.yd. sect. 2, in Houston Ship Channel.

Utah—POST OFFICE—Treas. Dpt., at office Supervising Archt., Wash., D. C., post office addition, 24th St. $265,000 appropriated.

Bids Asked

California—ROAD—Aug. 27, by C. H. Sweetser, dist. engr. Bureau P. Rd., 461 Market St., San Francisco, grading, rock surfacing 4.2 mi. Strawberry-Phillips Rd. Sect. Route 32, Natl. Forest Hy., El Dorado Co.

Calif., Benicia—MAGAZINE—Sept. 12, by Constructing Quartermaster, arsenal magazine and roads.

Conn., New Haven—DREDGING—Sept. 6, by U. S. Engineer Office, Providence, R. I. dredging 242,000 cu.yd. in West River, New Haven Harbor; adv. E. N.-R. Aug. 15.

D. C., Wash.—AIR COMPRESSORS ETC.—Aug. 19, by A. L. Flint, genl. Purch. agent, Panama Canal, air compressors, road roller, truck chassis, sewer, and water pipe, fire brick, etc. Schedule 1980.

Fla., St. Petersburg—DREDGING—Aug. 26, by U. S. Engineer's Office, Jacksonville, 6,200 lin.ft. channel near Point Pinellas. Noted June 20.

Idaho — CLEARING SITE — Aug. 26, by Bureau Reclamation, Dpt. Interior, Denver, Colo., clearing 3,300 acres, reservoir site for Deadwood Dam, Payette Div., Boise Project.

Idaho—EARTHWORK—Sept. 17, by Bureau Reclamation, Dpt. Interior, earthwork and structures, Main Canal, Gravity Extension Div., Minidoka Project; adv. E. N.-R., Aug. 15.

Ia., Denison—WATER PIPING—Sept. 5, by Treas. Dpt., at office Supervising Archt., Wash., D. C., water supply pipe, plumbing, heating and lighting repairs, at U. S. Post Office.

Maine and New Hampshire—BREAKWATER—Aug. 30, by U. S. Engineer Office, Custom House, Boston, Mass., repairing Isles of Shoals Breakwater; adv. E. N.-R. Aug. 15.

Mississippi—LEVEE—Aug. 20, by U. S. Engineer Office, Vicksburg, 2,090,000 cu.yd. levee work in Mississippi River.

Montana—EARTHWORK—Sept. 20, by Bureau Reclamation, Dpt. Interior, Fairfield, earthwork and structures, on Spring Valley Canal, Sun River Project; adv. E. N.-R. Aug. 15.

N. J., Lake Denmark (mail Hibernia) — MAGAZINES—Spec. 5813—Aug. 28, by Bureau Yards & Docks, Navy Dpt., Wash., D. C., magazaines at Naval Ammunition Depot; adv. E. N.-R. Aug. 15.

N. Y., Syracuse—AIRPORT—Resident Engineer, Curtiss Flying Service, and C. Russel, engr., 29 West 57th St., New York, taking bids airport, incl. hangar, shop, $70,000.

Okla., Fort Gibson—HEATING SYSTEM—Aug. 22, by Constructing Quartermaster, hot water heating system for lodge.

Tenn., Memphis—DIKES—Aug. 23, by U. S. Engineer Office, 13,900 lin.ft. dikes in vicinity of Islands 8 and 35, in Mississippi River.

Virginia—DREDGING—Sept. 6, by U. S. Engineer Office, Norfolk, 621,250 cu.yd. sand and mud and 466 cu.yd. rock removal in Appomattox River; adv. E. N.-R. Aug. 15.

Va., Fort Humphreys — WATER SYSTEM, etc. — Aug. 23, by Constructing Quartermaster, water distribution, sanitary sewer systems.

Va., Petersburg—STABLE, etc.—Aug. 23, by Constructing Quartermaster, brick stable, septic tank, etc.

Wash., Walla Walla—OIL BURNING EQUIPMENT—Aug. 27, by U. S. Veterans Bureau, Arlington Bldg., Wash., D. C., fuel oil burning equipment, at U. S. Veterans Hospital.

C. Z., Albright Field—LANDING FIELD—Sept. 23, by Constructing Quartermaster, Quarry Heights, 369,500 cu.yd. earth excav. and placing same in embankment to form part of aeroplane landing field; adv. E. N.-R. Aug. 15.

C. Z., Coco Solo—BARRACKS—Spec. 5837—Sept. 18, by Bureau Yards & Docks, Navy Dpt., Wash., D. C., 1 barracks, 1 subsistence building at Naval Air Station; adv. E. N.-R. Aug. 15.

Bids Received

Mass., Boston — HEATING EQUIPMENT — Constructing Quartermaster, heating equipment from W. M. Collins Co., 150 Tyler St., $6,485.

N. J., Oceanport — ROADS — Constructing Quartermaster, roadwork from Stryker & Stryker, Red Bank, $4,695.

O., Cincinnati—QUARTERS—Treas. Dpt., at office Supervising, Archt., Wash., D. C., Aug. 2, additional quarters, at U. S. Post Office and Court House, from English Constr. Co., 1311 H St. N. W., $9,100. Noted July 11.

Contracts Awarded

Colorado—ROAD—Bureau P. Rds., Denver, grading 3.95 mi. Tennessee Pass, Sect. F, Lake Co., to W. W. Giggey & Co., Boulder, $52,017.

La., New Orleans—BRIDGES and NEEDLES—U. S. Engineer Office, service bridges and needles, Bonnet Carre Spillway, to Doullut Ewin Inc., Q and C Bldg., $193,933. Noted Aug. 1.

La., New Orleans—LEVEE WORK—U. S. Engineer Office, 1,340,000 cu.yd. levee work at Courtalbeau, to John Riess, New Orleans Bank Bldg., $186,260—1,730,000 cu.yd. at Courtableau to J. P. Herbert, Breaux Bridge, $311,400—6,900,000 cu.yd. to J. J. McCaughey Co. and States Contg. Co., 189 West Madison St., Chicago, Ill., $1,254,420—and 1,650,000 cu.yd. at Maringwoin-Ramah Lots 1 and 2 to Dameron & Kenyon, Port Allen, $34,860. Grand total $1,786,940.

Missouri — DIKES — U. S. Engineer Office, Postal Telegraph Bldg., Kansas City, 4,200 lin.ft. and 9,100 pile clump dikes, in Missouri River to Bilhorn, Bower & Peters, Inc., Railway Exchange Bldg., St. Louis, $123,763 and $266,445 respectively; 3,000 ft. dikes and 13,800 ft. revetment to Massman Constr. Co., 519 American Bank Bldg., Kansas City, $335,000; 20,350 lin.ft. revetment to A. W. Farney, Kansas City, $373,719. Grand total $1,098,927. Noted June 28.

N. J., Oceanport—QUARTERS—Construction Quartermaster, Fort Monmouth, five 4 family apartments to G. H. Evans, Inc., 1415 Vine St., Phila., Pa., $324,840. Noted Aug. 8.

Oregon—ROAD—U. S. Bureau P. Rds., grading 5.5 mi. Umatilla National Forest Rds. to J. A. Terteling & Sons, Boise, Idaho, $51,695.

S. C., Charleston—DREDGING—U. S. Engineers Office, 36,911 cu.yd. in Ashley River and 45,100 cu.yd. in Cooper Rd. to P. Sanford Ross, Inc., 227 Washington St., Jersey City, N. J., $34,732. Noted June 6.

RAILWAYS

Bids Asked

New York—Aug. 20, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., relocating tracks Jamaica Central Rys., Inc., in Liberty Ave.

Contracts Awarded

New York—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., relocating tracks Queens Blvd.; also Quentin and Hillside Ave. to Eastern Contg. Co., 375 Fulton Ave., Brooklyn, $57,071 and $113,768, respectively.

TUNNELS AND SUBWAYS

Bids Received

Pa., Phila.—AUTOMATIC BLOCK SIGNALING and INTERLOCKING—Dpt. City Transit, F. E. Myers, dir., City Hall Annex, July 30, 5.3 mi. automatic block signaling and interlocking system for Broad Street Subway between South St. and point north of Girard Ave. Contr. 225, from Union Switch & Signal Co., Swissvale, $645,250. Noted July 25.

Contracts Awarded

N. Y., Brooklyn—SUBWAY—Bd. Transportation, J. H. Delaney, chn., 49 Lafayette St., New York, Route 107, Sect. 6 Rapid Transit R.R. to Del Balso Constr. Co., 900 Zerega Ave., New York, $4,654,052. Noted July 18.

PIERS AND WHARFS

Proposed Work

Calif., Crescent City—WHARF—Hobbs, Wall & Co., pile and timber wharf connecting with Crescent City breakwater, $25,000.

Mass., New Bedford — WHARVES — City, G. H. Sister, chn. comrs., plans repairing and reconstructing city wharves at water front, City Pier 3, incl. wood piling, rip rap, concrete, G. O. Gardner, supt. buildings, engr.

Bids Asked

N. Y., Albany—DOCK—Aug. 21, by Albany Port Dist. Comn., 74 Chapel St., pile driving, timber dock, substructure, sewer extension etc. at Weserlo Island. Contr. 27. A. G. Chapman, ch. engr.

AIRPORTS

Proposed Work

Calif., Alameda — Curtis Airports Corp., Alameda Airport, plans additional hangars, enlarging airport. To exceed $1,000,000.

Calif., Sacramento—City, preliminary plans by J. C. Petersen, municipal airport, Stockton Blvd. $900,000. B. C. Clark, city engr.

Colo., Denver—Curtis Flying Service, 29 West 57th St., New York, plans hangar, shops and school. $70,000. C. Russell, 29 West 57th St., New York, archt.

Fla., Miami—Resident engineer, c/o Curtiss Flying Service, Municipal Airport, bids after Aug. 15, general contract 2 story, 120 x 120 ft., hangar, shops, waiting room, etc., $50,000, for Curtiss Flying Service, 29 West 57th St., New York. C. Russell, engr.

Okla., Oklahoma City—Curtiss Flying Service, 29 West 57th St., New York, plans brick, or galvanized metal, steel hangar, shops and flying school unit. $75,000. C. Russell, 29 West 57th St., New York, engr.

Okla., Tulsa—Curtiss Flying Service, 29 West 57th St., New York, plans hangar, shops and flying school unit. $60,000. C. Russell, 29 West 57th St., New York, engr.

Contracts Awarded

Md., Baltimore — Curtis Airports Inc., 29 West 57th St., New York, airport development, hangars, shops, to Stone & Webster, 120 Bway., New York. Est. $3,000,000.

N. Y., Valley Stream—Curtiss Airports Inc., 29 West 57th St., New York, general contract airport, incl. hangars, shops, school and administration Bldg., to Stone & Webster, 120 Bway., New York. Est. $3,000,000.

O., Cleveland — Curtis Airports Corp., 29 West 57th St., New York, hangar, shops, general airport development, Herrick Airport, to Stone & Webster, 120 Bway., New York. To exceed $2,000,000. Contractor taking bids on sub-contracts and materials.

SPORTS AND PARKS

Proposed Work

R. I., Providence — State Metropolitan Park Comn., State House, plans by G. H. McLean, c/o owner, bath house incl 2 wings, concrete floors, concrete tunnel 336 lockers, 48 inside dressing rooms, using Hy-rib construction.

Bids Asked

N. Y., Rye—Aug. 27, by Westchester County Park Comn., 72 West Pondfield Rd., Bronxville, constructing casino and fountain, at "Playland," Rye Beach. L. G. Holleran, Bronxville, acting ch. engr.; adv. E. N.-R. Aug. 15.

Contracts Awarded

N. Y., Buffalo — Dpt. P. Wks., Municipal Bldg., playground on 6 acre site in Tifft St., to H. H. Elhers, 2924 Main St., $21,200; drain and water lines, to H. R. Tankin, Houghton Pike, $6,800 and shelter house, to P. Colgan, 74 Commerce Ave., $4,995. Grand total $32,995. Noted May 2.

HEATING AND VENTILATING

Contracts Awarded

Mass., Great Barrington—Town, heating and ventilating in high school addition, to Berkshire Heating & Plumbing Co., Pittsfield. Est. $25,000.

Mass., Quincy — City, heating, ventilating hospital medical ward building, to F. W. Hibbett & Sons, 5 Maple St. Est. $25,000 or more.

N. Y., Brooklyn—HEATING, etc.—Bd. Educ., 500 Park Ave., New York, heating in P. S. 10, to D. J. Rice, Inc., 606 1st Ave., New York, $100,900; plumbing, to J. D. Duffy, Inc., 342 Madison Ave., New York, $26,777; electrical work, to Pyramid Electric Contg. Co., 222 West 42nd St., New York, $21,900; fixtures, to Simes Co., Inc., 22 West 15th St., New York, $4,689. Grand total $154,266. Noted May 30.

UNCLASSIFIED

Proposed Work

Calif., Glendora—UNDERGRADE CROSSING—State Hy., C. H. Pursell, st. hy. engr., Sacramento, undergrade crossing, under Atchison, Topeka & Santa Fe R.R., here. $120,000.

Minn., St. Paul—LIGHTING SYSTEM—City plans ornamental lighting system on East 7th St., Mounds Blvd. Hastings Ave. $30,225. J. W. Kelsey, city engr.

Okla., Oklahoma City — PUMP UNIT and TANK—Empire Line Co., Batesville, 8 centrifugal pump units, four 80,000 band steel storage tanks at tank farm. $130,000. Private plans.

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Unclassified (Continued)

Bids Asked

D. C., Wash.—GATES—Aug. 19, by District Comrs., District Bldg., 6 collapsible gates for elevators in District Building.

N. Y., New York—UNDERGROUND CABLE—See "Contracts Awarded."

N. Y., Creedmoor (mail Floral Park)—ELEVATOR—Sept. 4, by Commissioner Dpt. Mental Hygiene, Capitol, Albany, electric elevator for Bakery Building, Brooklyn State Hospital; adv. E. N.-R. Aug. 15.

Va., Lorton—SILOS—Aug. 26, by District Comrs., District Bldg., Wash., D. C., material for 2 tile silos and twin chute.

Contracts Awarded

Calif., Oceanside—LIGHTING SYSTEM—See "Streets and Roads."

Mass., Winchester—GREENHOUSE, etc.—J. Downs, Arlington St., 1 story, brick, steel, glass, greenhouse and boiler house, to W. A. Wentworth Co., 107 Pacific St., Cambridge. $25,000 or more.

Michigan — CULVERTS — E. R. Benkert, resident engr., Port Huron, 5 culverts, Tuscola Co., to Stafford & Barnes, Cass City, for State Hy. Dpt., Lansing, $30,928 incl. cement.

Minn., Minneapolis—GRAIN ELEVATOR—Archer Daniels-Midland Co., 600 Roanoke Bldg., general contract 1,000,000 bu. grain elevator, 29th Ave., S.E., and Marshal St., to Fegles Constr. Co., 529 South 7th St. Est. $300,000.

N. Y., New York—UNDERGROUND CABLE—New York Telephone Co., 140 West St., reconstructing underground cable on East 167th St., from Sheridan to Grandview Aves., by day labor.

Pa., Phila.—ELEVATORS—Dpt. City Transit, C. E. Myers, dir., City Hall Annex, passage way and escalator well, City Hall Station, Contr. 179, to G. F. Dobbin, 1020 South 47th St., $33,980. Noted July 25.

Tex., San Antonio—PIPE LINE—San Antonio Pub. Serv. Co., 201 North St. Mary's St., 6¼ mi. 18 in. c.i. gas pipe line around city at city limits. $135,000. Own forces. Noted Jan. 17 under "Unclassified."

MATERIALS

Proposed Work

PIPE—**Mountain View, Calif.**—City purchasing 1,000 ft. 4 in. c.i. pipe.

Bids Asked

FUEL OIL—**New Orleans, La.**—Aug. 19, at office G. J. Glover, chn. house com. Charity Hospital, 18,000 bbls. from Sept. 1, 1929 to Aug. 31, 1930, delivered, in tank cars, to Illinois Central switch.

PIPE—**Baltimore, Md.**—Aug. 20, by Bd. Awards, copper pipe for Bureau Water Supply, E. G. Rost, Municipal Office Bldg., water engr.

BINDER STONE—**New York N. Y.**—Aug. 22, by J. Miller, pres. Manhattan Boro. Municipal Bldg., 6,000 cu.yd. ¾ in. binder stone; 60,000 gal. gasoline.

Bids Received

ASPHALT—**New York, N. Y.**—P. J. Dooling, comr. Purchase, Municipal Bldg., asphalt to Dpt. Water Supply & Electricity, Municipal Bldg., from Standard Oil Co. of New York, 26 Bway., $1.837. Noted Aug. 1.

Contracts Awarded

STEEL and PIPE—**New Orleans, La.**—Sewer & Water Bd. furnishing riveted steel pipe for drainage system to J. H. Murphy Iron Wks., 700 South Broad St. $44,600.

CLAM SHELLS and SAND — **New Orleans, La.** — City Council furnishing clam shells period of one year, to Jahncke Service Inc., 814 Howard Ave., at $1.70 per cu.yd., lake shore sand, to Pontchartrian Sand & Shell Co., 2501 Clio St., $1.60 per cu.yd.

EQUIPMENT

Bids Asked

GRADERS—**Big Springs, Tex.**—Aug. 24, by Howard Co., c/o H. R. Debenport, co. judge, 10 or more pony patrol graders.

TRUCKS, TRAILERS, etc. — **San Antonio, Tex.**—City, c/o C. M. Chambers, mayor, bids about Aug. 19, 35 new trucks, 20 trailers, for street cleaning department and soon takes bids for 12 new tractors. Address J. Rubiola, comr. streets.

FOREIGN

Mexico—Aguo Caliente Co., c/o W. D. McAllister, archt., 527 Commonwealth Bldg., San Diego, Calif., swimming pool, bathhouses, power plant, to American Bldg. & Investment Co., 2672 5th Ave., San Diego, Calif. Est. $250,000.

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Buildings

RESIDENTIAL

(Apartments unless otherwise noted)

Bids Asked

Ark., Texarkana—Aug. 20, by W. A. McCartney, Sr., 2 and 11 story, 57 x 100 ft., brick, steel, rein.-con., hotel, Front, Main and State Line Aves., $400,000. J. Finger, Keystone Bldg., Houston, Tex., archt. Noted May 16.

Calif., San Francisco—D. Stone, archt., Great Western Power Bldg., Oakland, taking bids, 6 story, basement, steel, rein.-con., Pacific Ave. and Laguna St. for Marian Realty Co., 110 Sutter St. $300,000. Noted July 18.

Calif., San Francisco — See "Contracts Awarded."

Mass., Pittsfield—Aug. 19 (extended date), by W. T. Butler, Dawes Ave., 6 story, basement, 115 x 220 ft., brick, concrete, steel hotel, plain found. $900,000. Hart & Shape, 247 Park Ave., New York, archts., and J. McA. Vance, 24 North St., associate archt. Noted Aug. 8.

Mich., Cadillac — Pond & Pond, Martin & Lloyd, archts., 180 North Michigan Ave., Chicago, Ill., taking bids 3 story, brick hotel addition, North Mitchell St., for Thompson Bros. Hotel Co.

N. J., Hackensack—P. J. Jossier, archt., 242 Broad St., Palisades Park, bids about Sept. 4, general contract 5 story, basement, brick, steel, Prospect St., for owner, c/o architect. $500,000. Noted July 11.

Contracts Awarded

Calif., San Francisco — E. B. DeGolia, 206 Sansome St., 16 story, basement, rein.-con., steel hotel, Post St. near Jones St., to Cahill Bros. Financial Center Bldg., $350,000.

Calif., San Francisco—Sharboro & Jorgensen, 225 North Point St., 3 story, stucco, Marina Dist., day labor, $150,000. Irvine & Ebbets, Call Bldg., archts.

Calif., San Francisco — T. B. Strand, 521 Pierce St., 4 story, basement, rein.-con., Pacific Ave. near Gough St., day labor. $150,000. Irvine & Ebbets, Call Bldg., archts. Noted Jan. 3.

Conn., Bridgeport—W. F. Chatlos, Broad St., Stratford, brick and steel apartment. $250,000. Owner builds. Noted Apr. 25.

Mass., Mattapan (sta. Boston) — Brooklyn Holding Co., c/o G. P. Connor, engr. and archt., 110 State St., Boston, 2 and 3 story, basement, brick units, plain founds., Almont St., to Brooklyn Constr. Co., c/o engineer. Est. $250,000 or more.

N. Y., New York—Down Town Homes, Inc., 31 Union Sq., hotel, to J. H. Taylor Constr. Co., 31 Union Sq. Est. $2,000,000. Noted **May 2.**

Pa., Phila.—Bee Bee Constr. Co., Fox Bldg., 4 story, basement, 45 x 185 ft., and 38 x 78 ft., brick, steel, plain found., 53rd and Wynnefield Sts., to Sort Constr. Co., Fox Bldg. Est. $240,000.

Pa., Phila.—Edelstein & Bernstein, 219 South Broad St., 4 story, basement, 86 x 152 ft., brick, steel, plain found., 61st and Balto Sts., separate contracts. $250,000. J. E. Fieldstein, Otis Bldg., archt.

Pa., Phila.—D. Iokolow, 329 Elmwood St., 4 story, basement, 120 x 140 ft., brick, steel, plain found., Mt. Airy and Emlen Sts., separate contracts. $300,000. J. Naschold, 5234 North 2nd St., archt.

Pa., Phila. — R. F. Johnson, Oxford Bank Bldg., 4 story, basement, 88 x 115 ft., brick, steel, plain found., 51st and Woodbine St., separate contracts. $250,000. W. Paley, 4700 Springfield Ave., archt.

Pa., Phila.—Mt. Airy Arms Corp., Real Estate Trust Bldg., 4 story, basement, 38 x 155 ft. and 25 x 43 ft., brick, steel, plain found., Sprague and Ardleigh Sts., to A. A. Shalton, Real Estate Trust Bldg. Est. $150,000.

Pa., Phila.—Mary A. Trask Co., Mayfair House, 4 story, basement, 100 x 142 ft., brick, steel, plain found., Church Lane and Ogontz St., to Barnett Constr. Co., Mitten Bldg. Est. $115,000.

Pa., Phila.—Stanton Realty Co., 1600 Walnut St., 4 story, basement, 76 x 169 ft., brick, steel, plain found., Phil-Ellena and Vernon Sts., separate contracts. $250,000. Stetler & Dysher, 709 Chestnut St., archts.

Pa., Phila. — Steinman & Lessee, 25 South 59th St., 4 story, basement, 34 x 100 ft., brick, steel, plain found., Walnut and 47th Sts., separate contracts. $175,000. Barnet Glicker, 2111 North 8th St., archt.

Pa., Phila. — Steinman & Lessee, 26 South 59th St., 4 story, basement, 56 x 144 ft., brick, steel, plain found., Penn and Knox Sts., separate contracts. $200,000. I. W. Levin, 1011 Chestnut St., archt.

Wis., Madison—W. Washington Bldg. Co., 105 Wells St., 5 story, basement, 66 x 165 ft., to C. B. Fritz & Co., 138 Frances St. Est. $200,000.

Ont., Toronto—Standard Builders Ltd., 352 Adelaide St. W., 4 story, basement, 120 x 125 ft., concrete, brick, stone, steel, Vaughn Rd., day labor. $200,000. V. L. Morgan & Co., 1454A Yonge St., archts.

CLUBS

Proposed Work

N. J., Passaic — Y.W.C.A., 209 Madison Ave., New York, takes bids in September, 3 story, basement, brick, steel, plain found., Prospect St. and Passaic Ave. $350,000. L. Jallade, 15 East 47th St., New York, archt. Noted June 20.

N. J., Passaic—Passaic City Club, Prospect St. plans 2 story, brick, steel, plain found., 102-4 Gregory Ave. $150,000. Engineer and architect not selected.

N. J., Union City — **Italian Club**, c/o L. Vivoli, archt., 593 Palisade Ave., Grantwood, sketches 2 story, basement, brick, steel, plain found., $150,000.

Pa., Tarentum—Tarentum Lodge, 567 I. O. O. F., A. A. Hatch, chn., c/o New Kensington St. Railway, New Kensington, plans by E. J. Hatcher, Empire Bldg., Pittsburgh, 4 story, basement, 50 x 100 ft., brick, clubhouse, 7th and Corbett Aves. $150,000.

Bids Asked

N. J., Camden—Aug. 21, by Lackey & Hetel, archts., 544 Federal St., 8 story, 75 x 302 ft., rein.-con., brick, wood pile found., Baird Blvd. and Delaware Bridge, for Athletic Club of Camden, P. H. Hardmg, Otis Bldg., 621 Cooper St. Noted Apr. 11.

N. J., Preakness—Preakness Hill Country Club, c/o Lee & Hewitt, archts., 152 Market St., Paterson, taking bids general contract 1 story, basement, brick, steel, plain found., $150,000.

W. Va., Huntington—W. Meanor, archt., bids about Sept. 15, 4 story, 90 x 180 ft., brick, concrete Y.M.C.A. building, 6th Ave. $200,000.

Contracts Awarded

N. Y., New York—New York County Lawyers Association, 27 Pine St., 5 story, brick, steel stone, to James Stewart & Co., 230 Park Ave. Est. $600,000. Noted July 4. Contractor taking sub bids.

O., Cincinnati — Maketewah Country Club, Reading Rd., 2 story, basement, brick, rein.-con., plain found., to C. V. Maescher & Co., 2116 Florence Ave. $350,000. Noted Jan. 3, 1928.

Tenn., Memphis—Wyatt C. Hederick Co. (owner and architect), 1st Natl. Bank Bldg., Ft. Worth, Tex., 6 story, 148 x 148 ft., storage garage, North 3rd and Court Sts. $600,000.

HOSPITALS

Proposed Work

Mo., St. Louis—Washington University School of Medicine, 602 South Euclid Ave., soon lets contract 11 story, basement, 67 x 94 x 82 x 118 x 169 ft, ear, throat, eye and nose hospital, brick, stone, rein.-con. Jamieson & Spearl, Arcade Bldg., archts. W. J. Knight & Co., Wainwright Bldg., engrs. Noted June 6.

New York — Commissioner of Architecture, Albany, plans additions at Creedmore State Hospital, Central Islip State Hospital, Pilgrim State Hospital, Kings Park State Hospital and Harlem Valley State Hospital. Est. $18,875,000.

N. Y., Utica—Faxton Hospital, 1678 Sunset Ave., plans by Baggs & Newkirk, U G & E Bldg., $250,000.

O., Cincinnati—Comrs. Hamilton Co. Court House, plans by H. Hake, 2400 Gilbert Ave., 4 story, basement, rein.-con. nurses home, plain found., Guerley Rd. $297,180.

Tex., Galveston—John Sealy Hospital (state), bids in November, nurses' home. $250,000. R. L. White, c/o University of Texas, Austin, architect and engineer. Noted Jan. 3 under "Buildings—Educational and Religious."

Bids Asked

Mo., Kansas City—Aug. 26, by Clerk Jackson Co., 3 and 4 story, basement, brick, rein.-con. $500,000. F. C. Gunn, 1108 Natl. Fidelity Bldg., archt. Noted Nov. 1, 1928.

Massachusetts—Aug. 16, by Commonwealth Massachusetts, Dpt. Mental Diseases, State House, Boston, hospital group, incl. 5 story, basement, brick, steel, stone main hospital; 1 to 3 story, dining hall, kitchen, laundry and storehouses, garage, plain founds., also 3 tunnels, Trapelo Rd., Waltham, Lexington and Belmont. $1,200,000. G. Robb, 14 Beacon St., Boston, archt. A. B. Franklin, Inc., 25 Haverhill St., Boston, engrs. Noted Mar. 21 under "Buildings—Commercial."

N. Y., Eastview — Aug. 30, at office F. L. Merritt, clk., Bd. Supervs. Westchester Co., Court House, White Plains, tuberculosis pavilion and Childrens tuberculosis building, at Grasslands Hospital. Walker & Gillette, 369 Lexington Ave., New York, archts.; adv. E. N.-R. Aug. 15. Noted June 20.

O., East Liverpool—City Building Comm., bids about Oct. 1, 2 story, basement, 40 x 100 ft., brick addition, West 5th St. $150,000.

Ont., Kingston—Aug. 22, by Stevens & Lee, 62 Charles St. E., altering and constructing 3 story, basement, concrete, brick, steel, stone additions, for Kingston Genl. Hospital, George St. $200,000.

Hospitals (Continued)

Contracts Awarded

Mass., Gardner—Dpt. Mental Diseases, State House, Boston, general contract 3 story, brick, steel hospital, to L. Rocheford & Son, 44 Front St., Worcester, $91,949; heating, to F. M. Zemeir & Co., 140 Castle St., Boston, $18,200; plumbing, to T. F. Nolan, 32 Chardon St., Boston, $14,232. Total est. $150,000. Noted July 18 under "Buildings Commercial."

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, basement, irregular sized, brick, nursery at Wrentham State School, plain found., to T. A. Sheehan, 403 Union Ave., Framingham. Est. $150,000. Noted July 18 under "Buildings—Commercial."

N. Y., Port Chester — United Hospital of Portchester, hospital, to W. L. Crow Constr. Co., 101 Park Ave., New York. Est. $1,000,000. Noted June 28.

O., Circleville—City, 2 and 3 story, 86 x 100 ft., brick, steel, concrete, to D. W. McGrath & Sons, 255 East Broad St., Columbus. Est. $150,000.

CHURCHES

Proposed Work

Colo., Colorado Springs—Bd. Trustees, Colorado College, plans by J. Gray, Colorado Bldg., Pueblo, memorial chapel. $225,000. C. H. Walker, 100 Arlington St., Boston, Mass., consult. archt. Noted July 4.

Colo., Colorado Springs — First Christian Church, T. H. Mathieson, pastor, plans by E. E. Nieman, 221 East Cache la Poudre St., brick, stone, steel, Cascade and Platte Aves. $150,000 Noted Dec. 20.

Ill., Chicago—First St. Pauls Lutheran Congregation, plans by Miller & Wallace, 222 West Adams St., 12 story, 130 x 140 ft., brick, stone, LaSalle and Goethe Sts.

Ill., Chicago — Pilgrim Lutheran Congregation, 1952 Cullom Ave., plans by Miller & Wallace, 222 West Adams St. 1 story 100 x 130 ft., incl. Sunday school and gymnasium, Cullom and Winchester Aves.

Mass., Worcester — Second Advent Christian Church, C. O. Farnham, chn. building com., 95 June St., church, Russell and Pleasant Sts. $150,000 or more. Private plans.

Mich., Detroit—Brewster-Pilgrim Congregational Church, c/o F. O. Varney, 724 Michigan Theatre Bldg., archts., 2 story, basement, 80 x 110 ft., concrete, brick, steel, stone, plain found., Hogarth Ave. $150,000.

O., Cleveland—Christ the King Roman Catholic Church, T. M. Shannon, pastor, 16359 Euclid Ave., sketches by W. Koehl, 1900 Euclid Bldg., brick, steel, concrete incl school and parish house, Quillian Rd.

Pa., New Kensington—First Methodist Episcopal Congregation, soon lets contract 2 story, 52 x 100 ft., stone, R. P. L. Hogner, c/o Aluminum Co., Smithfield Bldg., Pittsburgh, archt. $150,000. Noted Apr. 4.

Bids Asked

Neb., Lincoln—First Plymouth Congregational church B. F. Wyland, pastor, 2535 A St., bids about Sept. 15, 1 and 3 story, 100 x 200 ft., brick, stone, steel, concrete, 20th and D Sts., $500,000. Magonigle & McLaughlin, 101 Park Ave., New York, archts. Noted July 12, 1928.

Contracts Awarded

D. C., Wash.—J. R. Pope, archt., 542 5th Ave., New York Church and Sunday School, to G. A. Fuller, Munsey Bldg., for Disciples of Christ. Est. $1,750,000. Noted May 3, 1928.

Pa., Phila.—H. D. Dagit & Son, archts., 1322 Race St., 2 story, basement, 36 x 160 ft., and 60 x 97 ft., brick, stone, limestone, plain found., to Nelson-Pedley Co., 1510 Chestnut St. for St. Madeleme Roman Catholic Church. Noted July 25.

SCHOOLS

Proposed Work

Ala., Auburn—Albama Polytechnic Institute, plans by Warren, Knight & Davis, Protective Life Bldg., Birmingham, 2 story, basement, 60 x 300 ft., brick, steel, rein.-con, textile and engineering building on campus. $200,000.

Conn., Hartford—City, plans by Golden-Stores & Co., 1015 Main St., school, North Main St. $200,000. Noted Oct. 11 under "Buildings—Educational and Religious."

Conn., Hartford—City, plans by W. R. McCornack, Bulkley Bldg., Cleveland, O., school, Niles St. $300,000. Malmfeldt, Adams & Prentice, 15 Lewis St., assoc. archt.

Conn., New Haven — St. Michael's Catholic Corp., 234 Greene St., plans parochial school, Greene St. $150,000. Engineer and architect not selected.

Conn., West Hartford (br. Hartford)—Town, West Hartford, plans by R. F. Barker, 15 Lewis St., Hartford, junior high school, Park Rd $350,000.

Mass., Cambridge—City, School Building Com. sketches by McLaughlin & Burr, 88 Tremont St. Boston, 3 story, basement, brick, stone, plain found., Harvard and Fayette Sts. $600,000. Noted July 4 under "Buildings Educational and Religious."

Mass., Deerfield—Deerfield Academy, F. Boyden, master, plans by Perry, Shaw & Hepburn, 141 Milk St., Boston, brick dormitory and class building, $200,000 each; plans by W. L. Walker, 103 Park Ave., New York, brick and steel science building, $200,000; also brick and stone chapel, $200,000. Engineer and architect not selected.

Mass., East Bridgewater—Town, H. L. Morehouse, chn. building com., soon takes bids 3 story, basement, 55 x 135 ft., brick, stone elementary school, plain found., Bedford St. $200,000. Hendrick & Haywood, 192 Boylston St., Boston, archts.

Mass., Easton — Town, School Dpt., G. C. Mann, bids in September 2 story, basement, brick, high school addition, plain found. $200,000. McLaughlin & Burr, 88 Tremont St., Boston, archts. Noted Aug. 18.

Mass., North Reading — Town, R. L. Esty, chn. building com., sketches by J. E. Allen, 351 Essex St., Lawrence, altering and constructing, 2 story, basement, brick, stone addition, plain found. $150,000 or more.

Mass., Roslindale—City, Schoolhouse Dpt., plans 2 story, basement, brick limestone, plain found., school, Charles Sumner Dist. $200,000 or more. Engineer and architect not selected. Owner taking bids on site.

Mass., West Roxbury (sta. Boston)—City of Boston, Schoolhouse Dpt., plans brick, limestone, plain found. Robert Gould Shaw Dist., $150,000 or more. Engineer and architect not selected.

N. Y., Maspeth — J. Bennet, plans by F. Wasselli, archt., 183 Berry St., Brooklyn, plans 2 story, 61 x 61 ft., Grand St. and Clarmont Ave. $150,000.

O., Waverly—Bd. Educ., plans by Devoss & Donaldson, Portsmouth, 2 story, basement, 97 x 110 ft., brick, concrete high school. $150,000.

Pa., Edinboro—State Teachers College, B. E. Taylor, Capitol Bldg., Harrisburg, plans by Meyers & Johnson, Commerce Bldg., 12th and State Sts., Erie, 2 story, basement brick, hollow tile science building, campus. $150,000.

Bids Asked

Calif., San Luis Obispo—Aug. 27, by State Dept., P. Wks., Sacramento, 2 story, 8,000 sq.ft. floor space rein.-con., boys dormitory for Polytechnic School.

Conn., Kent — Shreve, Lamb & Harmon, archts., 11 East 44th St., New York, taking bids brick and steel dormitory and chapel, Kent School, $150,000. R. H. Ballard, 607 5th Ave., New York, associate archt.

Ga., Chickamauga—Aug. 28 by R. H. Hunt & Co., archts., James Bldg., Chattanooga, Tenn., Gordon Lee Memorial School, 2 story, brick, $160,000.

Ill., Quincy—Bd. Educ., c/o J. C. Whitefield, Broadway Bank, bids about Oct. 1, 3 story, rein.-con., brick, stone high school, 14th St. between Main and Jersey Sts. $500,000. Behrensmeyer & Haffner, Western Catholic Union Bldg., archts.

Ind., Aurora—Aug. 29, by School Comrs., 2 story, basement, 85 x 156 ft., brick, steel, $150,000. Henkel & Hanson, Connersville, archts. Noted May 2.

Ind., Fishers—Aug. 22, by School Comrs., G. Fuller, trustee, 2 story, basement, brick, steel, incl. auditorium, gymnasium, $150,000. A. A. Faulstich, Cicero, archt. Noted July 18.

Ind., West Lafayette—Aug. 16, by School Comrs, 2 story, basement, 114 x 220 ft., brick, rein.-con., Columbia and North Sts., $150,000. W. Scholer, Lafayette, archt.

Mass., Somerville (br. Boston)—City, L. M. Conwell, mayor, city hall, taking bids 2 story, basement, brick, stone, Puritan Rd., plain found. $150,000. J. P. Hefferman, 175 High St., Boston, archt. Noted July 11, under "Buildings—Educational, Religious."

Mass., Wakefield—Town, F. J. Henkel, chn. building com., taking bids altering and constructing 2 story, basement, brick, limestone, steel addition, Montrose St. $150,000. E. M. Bridge, 248 Boylston St., Boston, archt. Whidden-Beekman Eng. Co., 100 Arlington St., Boston, engrs. Noted July 25.

Mich., East Detroit—Aug. 23, by S. Schook, secy., Bd. Educ., 3 story, part basement, 135 x 177 ft., brick, steel, concrete, stone, plain found., $190,000. W. S. Holmes Co., 112 East Allegan St., Lansing, archt. Noted Aug. 8.

Mich., Flint — Aug. 20, by C. J. French, secy., Bd. Educ., 2 story, basement, 172 x 200 ft., brick, steel, concrete, stone, Vernon Ave., $400,000. Malcolmson & Higginbotham, 1219 Griswold St., Detroit, archts.

Mich., Wyandotte — Aug. 21, by E. Haas, secy., Bd. Educ., 2 story, basement, rein.-con., brick, steel, stone, plain found., Superior Blvd., $150,000. B. C. Wetzel & Co., 2317 Dime Bank Bldg., Detroit, archts. Noted Apr. 18.

N. J., Elizabeth—Bd. City Comrs., City Hall, taking bids on revised plans 2 and 3 story, basement, brick, steel, plain found., Morell and Catharine Sts. $250,000. L. Quien, Jr., 299 Broad St., archt. Noted Aug. 8.

N. Y., Mount Vernon—Bd. Educ., bids about Sept. 1, 2 school additions, $680,000. H. Werner, 1 West 47th St., New York, archt.

N. Y., Norwood—Bd. Educ., new high school.

R. I., Westerly—Aug. 26, by T. Perry, Town Hall, Junior High and Industrial School, 2 story, basement, brick, plain found., Granite St. $150,000 or more. Monahan & Meikle, 255 Main St., Pawtucket, archts. Noted Apr. 25 under "Buildings—Educational, Religious."

Tex., Uvalde—Bd. Educ., G. D. Dean, secy., taking bids 2 story, brick, rein.-con. $150,000. Adams & Adams, Real Estate Bldg., San Antonio, archts.

D. C., Wash.—Aug. 27, by District Comrs., District Bldg., extensible school building, incl. combination gymnasium, assembly hall, M St. between 2nd and Canal Sts.; adv. E. N.-R. Aug. 15.

Contracts Awarded

Conn., Hamden (br. New Haven) — Town, School Bd., 2 story, basement, brick, steel school, assembly hall ,to Fusco & Amatruda, 42 Church St., New Haven. Est. $150,000. Noted June 27 under "Buildings—Educational and Religious."

Ind., Milan—School Comrs., W. Wilson, supt., general contract, 2 story, basement, 65 x 142 ft., rein.-con., brick, steel, to V. Jeurling & Son, 634 South 9th St., Richmond. Est. $150,000. Noted June 6.

Utah, Copperton—School Bd., Jordan School Dist., 3 story, basement, rein.-con., brick, to T. G. Rowland, Salt Lake City, $184,000. Noted July 18.

Me., Auburn — City, G. R. Gardner, supt. schools, Edward Little High School addition, general contract 2 story, basement and ell, 70 x 200 ft., brick, plain found., to L. Rocheford & Son, 44 Front St., Worcester, Mass.; heating and ventilating to Fels Co., 42 Union St., Portland; electrical work to G. A. Close Co., 18 Monument Sq., Portland; plumbing to J. H. Stetson Co., 65 Lisbon St., Lewiston. Total est. $200,000. Noted July 18.

Mass., Southboro—Town, 2 story, basement, brick, stone, steel, plain found., to I. P. Rocheford, 29 Arch St., Framingham. Est. $150,000.

Md., Violetville (mail Baltimore)—Mayor and City Council, City Hall, 2 story, 63 x 244 ft. stone, concrete, to Price Constr. Co., Maryland Trust Bldg., Baltimore, $142,700. Est. $50,000. Noted Aug. 1.

Mich., Flint—Bd. Educ., general contract 2 story, basement, concrete, brick, steel, stone, plain found., Durand St., to Roepke Bros., Flint. Est. $220,000. Noted July 25.

Nev., Reno—University of Nevada, 2 story, basement, rein.-con., brick science building, to J. C. Dillard, Reno, $212,888; plumbing heating, electrical work, to LaTourrette-Fical Co., 905 Front St., Sacramento, Calif., $107,330. Noted July 18.

O., Middletown—Bd. Educ., R. Snyder, secy., 3 story, basement, 175 x 300 ft., rein.-con., brick, steel, plain found., to H. R. Blagg Co., 1229 East 3rd St., Dayton, $295,980. Noted July 11.

Pa., Doylestown—National Farm School, S. B. Daniels, 2 story, basement, 50 x 100 ft., brick, plain found., near here, to John S. Bailey & Bro., Doylestown. Noted Aug. 8.

Pa., Swedeland — Bd. Educ., Upper Merion Twp. junior high school, 2 story, basement, 108 x 217 ft., brick, steel, plain found., near here, to Stone & Nace, Quakertown, $155,295; plumbing, to Crissman & Quillman, Norristown, $11,000, heating, to American Heating & Ventilating Co., Schaff Bldg., $30,000. Grand total $196,290.

R. I., Providence—City, 3 story, basement, 190 x 280 ft., brick, junior high school, plain found., to E. Turgeon, 36 Exchange Pl., $952,783; plumbing, to M. Hennessy & Co., 99 Fountain Ave., $57,000; electrical work, to Scannevin & Potter, 22 Aborn St., $25,957; heating and ventilating to G. M. Montle, Industrial Trust Bldg., $123,875. Grand total $1,159,615. Noted July 11 under "Buildings—Educational and Religious."

THEATERS

Proposed Work

Calif., Los Angeles — H. W. Chotiner, 3000 West 8th St., 150 x 300 ft., Class A theatre, Wilshire Blvd. $500,000.

Calif., Stockton—West Coast Theatres, Inc., 1066 Market St., San Francisco, soon lets contract 2 and 3 story, basement, steel, concrete theatre, 3,000 seating capacity, E. Main St., $300,000. Balch & Stanberry, Film Exch. Bldg., Los Angeles, archts. Noted July 4.

Ill., Chicago — United Theatres Corp., 190 North State St., plans by Dyer & Nadherny, 38 South Dearborn St., 6 story, 123 x 170 x 180 ft., brick, rein.-con., Ogden Ave. and Monomies St. $1,000,000.

Mass., Fall River — Radio-Keith-Orpheum Corp., F. H. White in charge, 1564 Bway., New York, plans theatre and store. To exceed $150,000. Engineer and architect not selected.

Bids Asked

N. J., Paterson—A. E. Sleight & Son, archts., 136 Washington St., bids about Sept. 15, general contract 1 story, basement, brick, steel plain found., Market St. $150,000. Noted July 25.

N. Y., Stapleton—Paramount Theatres, Inc., Paramount Bldg., bids about Sept. 1, general contract theatre, $500,000. Rapp & Rapp, Paramount Bldg., New York, archts.

Que., Montreal—Consolidated Theatres Corp., Ltd., 12 Mayor St., soon lets contract, Catherine St. E., $600,000. T. W. Lamb, 644 8th Ave., New York, archt.

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Theaters (Continued)

Contracts Awarded

Mich., Grosse Pointe Village (mail Grosse Pointe)—Punch & Judy Theatre, c/o R. O. Derrick, archt., Union Trust Bldg., Detroit, 2 story, basement, 100 x 100 ft., brick, steel, rein.-con., stone, plain found., to Hazleton & Clark Co., 872 West Milwaukee Ave., Detroit. Est. $150,000.

BANKS

Proposed Work

D. C., Wash.—Amer. Security & Trust Co., 15th St. and Pennsylvania Ave., bids in fall, general contract 10 story, brick, 15th St., near Pennsylvania Ave. $500,000. York & Sawyer, 100 East 42nd St., New York, archts., Meyer, Strang & Jones, 101 Park Ave., New York, mechanical engrs. Noted May 16.

Contracts Awarded

Mass., Fall River—Fall River Co-Operative Bank, A. A. Allen, treas., 2 story, basement, irregular sized, brick, concrete, steel, plain found., to J. M. Darling, Jr., South Main St. Est. $150,000. Noted July 25 under "Buildings—Commercial."

Ill., Berwyn — E. Liska, archt., 38 South Dearborn St., Chicago, masonry and carpentry contract for 5 story, 94 x 110 ft., brick, stone, granite, incl. office, to A. B. Larson Co., 3837 West Lake St., Chicago, for Berwyn State Bank. Est. $350,000. Noted June 13.

OFFICES

Proposed Work

Mass., Boston—Owner, c/o M. Louis, archt., 73 Cornhill, 6 story basement, brick, stone, incl. store, plain found., Kingston St. $150,000.

N. Y., Hempstead—New York Telephone Co., 140 West St., New York, bids in September, 9 story, office and telephone exchange, Fulton St. Voorhies, Gmelin & Walker, 101 Park Ave., New York, archts.

Que., Montreal—Star Building Ltd., c/o Montreal Star, St. James St., plans by Ross & MacDonald, 1 Belmont St. $500,000.

Bids Asked

N. H., Claremont—J. P. Goddard Realty Co., 56 Pleasant St., taking bids 3 story, basement, 50 x 165 ft., brick, marble, incl. stores, plain found., Pleasant St. $150,000. F. L. Austin, 250 College St., Burlington, Vt., archt. Noted Aug. 1.

N. J., Newark—Fanning & Shaw, archts., 49 Ward St., Paterson, revising plans and takes bids about Aug. 15, general contract 21 story, basement, brick, steel, rein.-con., plain found., Market and Halsey Sts., for Larky Holding Co., c/o archt. Est. $1,000,000.

Contracts Awarded

Calif., Long Beach—Owner, c/o E. K. Martin, Fleming Bldg., San Bernardino, 8 story, basement, rein.-con., American and Cedar Aves., to Salih Bros., Quinby Bldg., Los Angeles, $300,000.

N. Y., Buffalo—F. D. Roosevelt, gov. and chn. State Office Site & Building Com., Capitol, Albany, structural steel and iron for State Office Building, to McClintic-Marshall Co., 39 Bway., New York, $69,700; foundation, to Harrison Eng. & Contg. Co., Ellicott Sq., $135,203. Noted July 18.

Pa., Phila. — Monarch Realty Co., R. Heyman and J. Greenberg, Fidelity-Philadelphia Bldg., 23 story, basement, 120 x 150 ft., rein.-con., brick, steel, incl. garage, plain found., to Wark Co., 1600 Walnut St., $3,000,000. Noted May 16.

Wis., Stevens Point — Hardware Dealers Mutual Fire Insurance Co., 4 story, basement, 130 x 130 ft., steel, brick, rein.-con., plain found., to Wm. Christensen Constr. Co., Racine.

Ont., Toronto—Hermant Investment Ltd., 21 Wilton Sq., 12 story, basement, 55 x 80 ft., rein.-con., brick, steel, stone, incl. loft, to Wilton Constr. Co., c/o owners. Est. $250,000. Noted May 9 under "Buildings—Commercial."

Que., Quebec City—Brice Bros. Co. Ltd., office, St. Anna St., to E. G. M. Cape & Co., 10 Catheart St., Montreal. $500,000.

STORES

Proposed Work

Calif., Fresno—Montgomery Ward Co., 14th St. and 29th Ave., Oakland, plan 3 story, basement, rein.-con., incl. warehouse, Fulton St. $250,000. T. A. Perkins, supt. of bldgs., c/o owner, engr. Noted Aug. 8.

Calif., San Francisco—Ranschoff's 225 Post St., plans by W. Polk & Co., 277 Pine St., 3 story, basement, rein.-con. $150,000.

Mo., St. Louis—Rossen Furniture Co., c/o H. Rossen, 1540 South Bway., soon lets contract 3 story, basement, 82 x 125 ft., brick, rein.-con., incl. offices, apartments, Grand Blvd. at Connecticut St., B. Shapiro, 1219 Syndicate Trust Bldg., archt.

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Mass., Boston—See "Offices."

Mass., Fall River—See "Theatres."

Pa., Phila.—Rodman Wanamaker Estate, W. N. Nevin, c/o John Wanamaker, plans by J. T. Windrim, Commonwealth Bldg., 24 story, basement, 100 x 204 ft., brick, steel, Broad and Chestnut Sts. $5,000,000.

Ont., Toronto—D. E. Bennett, Temple Bldg., 3 story, basement, concrete, brick, steel store and office, Spadina and Lonsdale Rds. $160,000. Engineer and architect not selected.

Ont., Toronto—Ryrie Estate, c/o Molesworth, West & Secord, archts., 43 Victoria St., 2 story (ultimately 4 story) basement, 120 x 120 ft., concrete, brick, stone Yonge St. $175,000.

Contracts Awarded

Ill., Chicago — Thielbar & Fugard, archts., 520 North Michigan Ave., 32 story, basement, 80 x 150 ft., brick, steel, rein.-con., incl. office, caisson found., to McLennan Constr. Co., 307 North Michigan Ave., for Trustees System Discount Co., 63 East Adams St. Est. $2,500,000. Noted June 27 under "Buildings—Commercial."

Ill., Chicago—A. S. Alschuler, Inc., archts., 28 East Jackson Blvd., masonry and carpentry contract 6 story, basement, 50 x 115 ft. store, to Wahl Constr. Co., 3310 Belmont Ave., for Goldblatt Bros., 1609 West Chicago Ave. Est. $300,000. Noted June 20.

Ind., South Bend—Northern Indiana Co., Michigan and La Salle Sts., general contract, 3 story, basement, 66 x 89 ft., brick, rein.-con., incl. office, to R. Sollitt, 518 Sample St. Est. $150,000. Noted June 6.

N. Y., Mamaroneck—Seminor Corp., 3 story, 80 x 80 ft., department store, Boston Rd. and Tompkins Ave., to W. L. Crowe Constr. Co., 101 Park Ave., New York.

Ont., Toronto — Woolnough Corsetiers Ltd., 384 Yonge St., general contract 2 story (ultimately 8 story), basement, 53 x 165 ft., rein.-con., brick, stone, to John G. Kent & Son, 1130 Bay St. Est. $150,000.

PUBLIC

Proposed Work

Kan., Kansas City—FIRE HEADQUARTERS—City clerk soon takes new bids 4 story, basement, 111 x 125 ft., brick, stone, rein.-con. $170,000. C. E. Keyser, Merrain Bldg., archt. Former bids returned unopened. Noted June 27.

N. Y., Brooklyn—ARMORY—New York City Armory Bd., Municipal Bldg., plans by Starrett & Van Vleck, 393 7th Ave., New York, altering 3½ story, 8th Ave., 14th and 15th Sts. $450,000.

N. Y., Schenectady—CITY HALL—City, C. Fagal, mayor, takes bids in September, 3 story, city hall, Jay and Liberty Sts. $1,000,000. McKim, Mead & White, 101 Park Ave., New York, archts. W. W. Chapin, 110 East 42nd St., New York, engr.

Pa., Media—COURTHOUSE—Comrs. Delaware Co., G. W. Wades, pres., rejected bids 144 x 364 ft., top addition, two 2 story, basement, 144 x 158 ft., wings, marble, granite. Will readvertise. C. W. Brazer, Crozer Bldg., Chester, archts. Noted Jan. 20.

Ont., Toronto—EXHIBITION—Canadian Natl. Exhibition, Lumsden Bldg., concrete, brick, steel, stone, Exhibition Park. $1,000,000. Engineer and architect not selected.

Ont., Windsor — COURT HOUSE and CITY HALL — City and Essex Co. (Sandwich) sketches courthouse and city hall. $2,000,000. M. E. Brian, city engr. J. J. Newman, Davis Blk., co. engr.

Sask., Saskatoon—POLICE STATION—City, police station. $150,000.

Bids Asked

La., Harrisonburg—COURTHOUSE and JAIL—Aug. 31, by Police Jury, 4 story, rein.-con., brick, stone. Est. $150,000. J. W. Smith & Associates, Monroe, archt.

N. Y., Attica—PRISON—Sept. 5, by R. F. C. Kieb, comr. Dpt. Corrections, 11 Pearl St., Albany, construction, steel work for Cell Building "A," dining room, kitchen and bakery building, power house and prison wall, Attica State Prison; adv. E. N.-R. Aug. 15.

Pa., Upper Darby — MUNICIPAL — Comrs. Upper Darby, 4 story, basement, 56 x 128 ft., and 50 x 75 ft., rein.-con., brick, steel addition, plain found., to Jones Redditt Co., McClatchey Bldg., $310,988. Noted Apr. 11.

BUILDINGS UNCLASSIFIED

Proposed Work

Conn., Hartford—WAREHOUSE—G. Fox & Co., Inc., 956 Main St., soon lets contract 8 story, 150 x 150 ft., rein.-con., Morgan and Talcott Sts. $400,000. Abbott Merket Co., 175 5th Ave., New York, archts. Noted June 27 under "Buildings—Commercial."

N. J., Newark—GARAGE—Owner, c/o M. A. Wolf, archt., 845 Broad St., sketches 3 story, basement, brick, steel, plain found., South St. $150,000.

N. J., Trenton—PASSENGER DEPOT—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta. Phila., Pa., sketches by E. A. Dennison & Assoc., 40 East 49th St., New York, passenger depot. $1,000,000.

O., Cleveland—COMMERCIAL and HEADQUARTERS — First Catholic Slovak Ladies Union, M. Grega, secy., 3289 East 55th St., plans by Fox, Duthie & Foose, 1936 Union Trust Bldg., 2 story, basement, 70 x 100 ft., brick, steel, concrete, Lee and Scottsdale Sts. $175,000.

Pa., Phila.—GARAGE—T. C. Lippincott, archt., 11 South 16th St., soon lets contract 3 story, basement, 55 x 107 ft., brick, steel, plain found., 163-12 Arch St., for D. Gordon, 340 North Broad St. $150,000.

Pa., Pittsburgh—WAREHOUSE—C. F. Haudenshield, 21 Diamond Sq., plans by R. Marlier, Empire Bldg., 3 story, basement, 50 x 100 ft., brick, rein.-con., Penn and 22nd Sts. $150,000.

Tenn., Nashville—GARAGE—R. R. Ogilvie, E. B. Craig, R. E. Fort, et al., plans by Hart, Freeland & Roberts, Independent Life Bldg., 6 story, 100 x 190 ft., brick, steel, stone ramp garage, 7th Ave. and Polk St. $600,000. Excavation to J. Oman Jr. Chamber Commerce Bldg.

Tex., Lubbock—RECREATION—T. Sanson, Lubbock, sketches by S. B. Haynes, 511 Myrick Bldg., 3 story, basement, 65 x 125 ft., brick, stone, rein.-con. $150,000.

Bids Asked

Conn., Hartford—HOME—Aug. 17, by Polish National Home Inc., J. W. Sitnik, pres., 2 story, basement, 80 x 135 ft., brick, steel, Polish Home and recreation building, Charter Oak Ave. $150,000. H. Ludorf, 410 Asylum St., archt. Noted Jan. 3.

N. Y., New York—EXCHANGE—Aug. 9, by New York Telephone Co., 140 West St., general contract 10 story, 100 x 125 ft., brick, steel, West 50th St. $2,000,000. Voorhies, Gmelin & Walker, 101 Park Ave., archts. Noted July 18.

N. Y., New York—EXCHANGE—New York Telephone Co., 140 West St., bids about Sept. 15, general contract 111 x 184 ft., brick, steel, East 17th St., $2,115,000. Voorhies, Gmelin & Walker, 101 Park Ave., archts. Noted July 18.

N. J., Passaic—GARAGE and SHOWROOM—F. P. Friedman, archt., 395 Springfield Ave., Newark, takes bids about Sept. 15, general contract 1 story, basement, 140 x 150 ft., brick, steel rein.-con., plain found., 102-08 Gregory Ave. for A. Garth, 14 Grove St., $150,000. Noted June 28.

N. Y., Tonawanda—GARAGE—Sun Oil Co., c/o W. C. Newell, 2246 Niagara St. taking bids garage, storage tanks, etc. $200,000. Private plans.

Contracts Awarded

Calif., San Francisco — SALES ROOM and WAREHOUSE — Investment Properties Co., Inc., Alexander Bldg., 3 story, concrete, Howard and 9th Sts., to Industrial Constr. Co., 680 Folsom St. $150,000. Graybar Electric Co., lessee.

Ill., Chicago — FILM EXCHANGE — Warner Bros., 839 South Wabash Ave., general contract 6 story, 100 x 170 ft., brick, rein.-con., movie headquarters and storage, to James Shedden & Co., 208 West Washington St. Est. $350,000. Noted June 6 under "Buildings—Commercial."

Ind., Michigan City — COMMUNITY — B. Spaulding, general contract, 2 story, basement, brick, rein.-con., to Tonn and Blank, Michigan City, $200,000. Noted July 4.

Mass., Brookline—GARAGES—A. Snyder & M. Rudnick, 18 Tremont St., Boston, 3 story, basement, 100 x 155 ft., rein.-con., steel auto showroom, garage, repair shop, plain found., to Marden & Orlando, 46 Cornhill, Boston. Est. $250,000. Noted Aug. 8 under "Contracts Awarded."

N. J., Newark—WAREHOUSE—Owner c/o Great Atlantic & Pacific Tea Co., (lessee) Sherman Ave., general contract 3 story, brick, steel, plain found., Queens St. to Moynahan Constr. Co., 710 Union Title Bldg., Indianapolis, Ind. Est. $150,000.

N. Y., Dobbs Ferry—EXCHANGE—New York Telephone Co., 140 West St., New York, telephone exchange, Ashford and Bellewood Aves. to W. A. Berbusse, Jr., 35 Bush Ave., Port Chester. Est. $150,000.

Pa., Erie—GARAGE—Times Square Garage, A. Emerman, 10th and Peach Sts., 4 story, 100 x 165 ft., brick, hollow tile, 10th and Peach Sts. $150,000. Owner builds. Private plans.

Pa., Pittsburgh — WELFARE — Pittsburgh Assoc. Improvement of Poor, 428 Duquesne Way, 4 story, basement, 78 x 100 ft., rein.-con., brick, steel, Webster and Washington Sts., to Mellon Stuart Co., Oliver Bldg. Est. $275,000.

Industrial—Buildings

FACTORIES AND MILLS

Proposed Work

Calif., Berkeley — FACTORY — Neilsen Steel Aircraft Co., 2nd and Camelia Sts., plans 2 story, 60 x 200 ft., brick, steel addition, 2nd and Camelia Sts. Private plans.

Calif., Fresno — PACKING PLANT — J. F. Forkner Packing Corp., Fig Garden Tract, sketches, fig packing plant, $100,000 or more.

Calif., Santa Ana — OIL DISTRIBUTING PLANT—Richfield Oil Co., Bartlett Bldg., Los Angeles, incl. office 25 x 47 ft. warehouse 42 x 80 ft., garage 35 x 120 ft., paint shop 30 x 30 ft., also concrete truck loading platform and rein.-con. fire wall. Private plans.

Factories and Mills (Continued)

Calif., San Jose—CANNERY—Gordon Valley Canning Co., L. Pecoraro, pres., 458 North Seventh St., steel, concrete, on Western Pacific R.R. $100,000. Architect not selected.

Calif., Vernon—FACTORY—Hotchkiss Co., c/o A. H. Stibolt, archt., 755 Western Pacific Bldg., Los Angeles, 3 story, basement, 85 x 310 ft., rein.-con. factory.

Colo., Colorado Springs—MILL—Golden Cycle Mill Co., A. E. Carlton, flotation mill, $70,000. Private plans.

Conn., Plainville — FACTORY — Trumbull Electric Mfg. Co., Woodford Ave., J. H. Trumbull, plans brick addition, $40,000 or more. Engineer and architect not selected.

Ky., Louisville — LAUNDRY — Paramount Laundries & Dry Cleaners Corp., 1213 Starks Bldg., 1 story, basement, 100 x 240 ft., brick, steel, rein.-con., 26th and Broadway. $48,000.

La., Shreveport — LAUNDRY — Shreveport Laundries, Inc., soon takes bids 1 story, 165 x 180 ft., rein.-con., stucco, Howell St. and Princess Pl. $250,000. Jones, Roessle, Olschner & Weiner, Ardis Bldg., archts.

N. J., Newark—MANUFACTURING—Westinghouse Electric & Mfg. Co., 150 Bway., New York, plans manufacturing plant, $8,000,000.

N. Y., Brooklyn — FACTORY — Eberhard Faber, Java and West Sts, altering and constructing 5 story, 40 x 74 ft., brick, addition, Java and West Sts. $50,000. F. H. Klie, 250 Park Ave., New York, archt.

N. Y., Long Island City—CARPET REFINISHING PLANT—A. A. Dodge, c/o Dodge & Morrison, archts., 160 Pearl St., New York, plans 200 x 200 ft. 37th Ave., 36th and 37th Sts. $60,000.

N. Y., New York — BAKERY — Horn & Hardart, 600 West 50th St., bids latter part of month, general contract 3 story, 605 West 49th St. $300,000. F. R. Platt & Bro., 211 West 57th St., archts. C. R. Place, 420 Lexington Ave., mechanical engr. Noted Aug. 1.

N. Y., New York—BRICK—Paramount Brick Wks., 724 Clinton St., Brooklyn, bids in October, 1 story, 158 x 204 ft., brick, Lafayette and Jeraga Aves., $120,000. Foundations awarded to A. H. Hazell, 26 Courtlandt St., New York. Berlinger & Kaufman, 66 5th Ave., archts.

N. Y., New York—PRINTING—Wall Street Journal, 44 Broad St., plans by Lockwood, Greene & Co., 100 East 42nd St., 5 story printing and manufacturing plant, 453 West 30th St. Est. $150,000.

O., Akron — PLANT — Akron Times Press Publishing Co., L. E. Herman, business mgr., 71 South High St., sketches by Howell & Thomas, 3868 Carnegie Ave., 3 story, brick, rein.-con., stone, newspaper publishing plant. $200,000.

O., Canton—FACTORY—Canton Drop Forge & Mfg. Co., 300 Odd Row Pl., 1 story, 90 x 600 ft., brick, steel factory unit, Willett Ave. Est. $100,000. Private plans.

Pa., Gibsonton (mail Belle Vernon) — BY-PRODUCT PLANT — Pittsburgh Steel Co., Union Trust Bldg., Pittsburgh, plans by-product plant. $3,000,000. Private plans.

Pa., Phila. — RADIO FACTORY — Atwater Kent Mfg., Abbotsford and Wissahickon Aves., soon lets contract radio manufacturing, $1,500,000. Ballinger Co., 105 South 12th St., archt.

Pa., Pittsburgh—FACTORY—Fero Electric Air Pump Co., B. M. Fero, in charge, 509 Penwood Ave., Wilkinsburg, sketches, 2 story, basement, 100 x 140 ft., brick, hollow tile, rein.-con., incl. garage, Penn Ave., $85,000. Architect not selected.

Pa., Pittsburgh—OIL PLANT—Standard Oil of Pennsylvania, Peoples Gas Bldg., oil plant, 33rd and 35th Sts. L. R. Wick, Peoples Gas Bldg., engr. Private plans.

Tex., Mercedes — ICE FACTORY — Central Power & Light Co., San Benito, soon lets contract 2 story, 100 x 150 ft., brick, steel, ice factory, 150 tons daily. $150,000. J. M. Marriott, Frost Natl. Bank Bldg., San Antonio, engr.

Alta., Chipman—MILL—J. Garritt, flour mill, $50,000.

Ont., Hamilton—BAKERY—Jackson Bread Co., Ltd., Leeming St., plans by G. T. Evans, Federal Bldg., 2 story, basement, concrete, brick, steel. $125,000.

Ont., Preston—FACTORY—Canadian Office & School Furniture Co., 1195 King St., 4 story, basement, 70 x 100 ft., brick, steel addition, King St., to O. Wiles, Lancaster St. W., Kitchener. Est. $60,000.

Ont., Toronto—FACTORY—Hamilton Bridge Co., Hamilton, brick, steel, concrete branch factory, Waterfront. $100,000. Private plans.

Ont., Toronto—BAKERY—Northern Bakeries Ltd., 71 Richmond St. W., plans by S. Comber, 515 New Birks Bldg., Montreal, Que. $100,000.

Bids Asked

Conn., East Hartford (br. Hartford)—AIRPLANE FACTORY—A. Kahn, archt., 1000 Marquette Bldg., Detroit, Mich., soon lets contract 2 story, 400 x 985 ft., brick, steel, for Pratt Whitney Aircraft Co., 450 Capitol Ave., Hartford. Noted July 25 under "Contracts Awarded."

Mich., Detroit — FACTORY — Packard Motor Car Co., East Grand Blvd., taking bids 3 story, 48 x 48 ft., rein.-con., brick, steel addition, plain found., East Grand Blvd. $50,000. Private plans.

Tex., Natalia — CERAMIC PLANT — San Antonio Suburban Irrigated Farms, c/o C. H. Kearney, Frost Bldg., San Antonio, taking bids Unit 1, $150,000; and plans Units 2 and 3, $250,000 or more. Address A. V. Lawton, Chamber of Commerce, San Antonio.

Contracts Awarded

Calif., Los Angeles — MILL — International Live Stock Feed Mills, 453 South Spring St., 60 x 280 ft., steel corrugated iron, Eastern Ave., to P. J. Walker Co., Garland Bldg., $75,000.

Calif., San Francisco—SLAUGHTER HOUSE—J. Allan & Sons, Evans Ave. and Third St., 4 story, rein.-con., Evans St., to Mission Concrete Co., 247 Turk St. $90,000. Noted June 6.

Calif., Emeryville — FACTORY — Marchant Calculating Machine Co., 2 story, rein.-con. factory, and 1 story, addition, from W. C. Keating, Central Bank Bldg., Oakland. $50,000.

Fla., Tampa — MANUFACTURING — Prestolite Co., Swann Terminals, Tampa, Fla., and 30 East 42nd St., New York, 1 and 2 story, brick, steel, to Frost Constr. Co., Marion and Twiggs Sts.

Ill., Chicago—FACTORY—Graham, Anderson, Probst & White, archts., 80 East Jackson Blvd, general contract 2 story, brick, factory to J. E. Ericsson & Co., 123 West Madison St., for Edison Electric Appliance Co. Inc., South Menard and Taylor Sts. Noted July 4.

Ill., Rockford — FACTORY — G. D. Roper Corp., masonry and carpentry contract for 1 and 2 story, factory and office, to Security Bldg., Rockford. Est. $750,000. Noted July 4.

Ind., Indianapolis—DAIRY—W. H. Roberts, 42nd St. and Millersville Rd., general contract 2 story, 100 x 200 ft., brick, steel creamery, to E. B. Ball & Son, 1131 North Tacoma St. Est. $150,000. Noted July 25.

Ind., Indianapolis—PLANT—Madison & Penn Co., general contract 1 story, basement, 130 x 160 ft., brick, steel, 511 Madison Ave., to W. E. Van Landingham, 309 Lemcke Bldg. Est. $47,210.

Ind., Lafayette—PLANT—Northern Indiana Service Co., general contract brick, steel, tile, to G. Dahm, 319 North 26th St. Est. $45,000. Noted June 27.

Md. Towson—FACTORY—Black & Decker Mfg. Co., 2 story, 140 x 200 ft., brick, steel factory, to W. H. Sands, East Pennsylvania Ave. Est. $200,000.

Mass., Bellingham—MILL—Taft Woolen Co., c/o contractor, 2 story, 80 x 110 ft., brick, plain found., Caryville Section, to Fiske-Carter Constr. Co., 8 Norwich St., Worcester. Est. $75,000.

Mass., Holyoke — PUBLISHING PLANT — Transcript Pub. Co., 180 High St., 2 story, basement, 50 x 80 ft., brick, steel, High and John Sts., to Casper Ranger Co., 20 Bond St. Est. $75,000. Noted July 18 under "Buildings—Industrial."

Mass., Walpole—FACTORY—Hollingsworth & Vose Co. J. O. Hill, purch. agt., 333 Washington St., Boston, 1 story, basement, 60 x 120 ft., brick, concrete paper factory, concrete found., to M. W. Allen Constr. Co., 767 East St. Est. exceeds $40,000.

Mich., Berrien Springs—FACTORY—Clark Equipment Co., 1 story, 130 x 205 ft., rein.-con., brick, steel, plain found., to Frank L. Shoemaker Constr. Co., East Congress St., Sturgis. Est. $75,000.

Mo., Carthage — STONE WORKS — Nucarth Stone Co., E. H. Wetzel, mgr., 1 story, 200 x 200 ft., rein.-con., brick, day labor. Private plans.

O., Cincinnati—FACTORY—Quality Service Co., Reading Rd., 2 story, brick, steel, rein.-con., plain found., Reading Rd., to Charles V. Maescher & Co., 2116 Florence Ave. $40,000.

O., Cleveland—FACTORY—Cummer Products Co., 2150 West 15th St. 1 and 2 story, 90 x 360 ft., brick, steel, concrete shaving cream factory, Dunham Rd., to J. Miller, 10819 Drexel Ave. $150,000.

O., Cleveland—FACTORY—Richman Bros. Co., C. L. Richman, pres., 16100 East 55th St., 5 story, 65 x 213 ft., brick, rein.-con. clothing factory addition, to Lundoff-Bicknell Co., B. F. Keith Bldg., $250,000. Noted July 25.

Pa., Ambridge—PLANT and WAREHOUSE—H. H. Robertson Co., 14th St., plant addition, 1 story, 50 x 80 ft. warehouse, 50 x 240 ft. to Penn Bridge Co., College Hill (mail Beaver Falls). Est. $60,000. Owner furnishes and erects steel.

Pa., Ellwood City — Aetna Standard Eng. Corp., Ellwood City and Youngstown, O., 1 story, 40 x 54 ft. and 45 x 120 ft., brick, steel factory additions, to J. H. DeCarpentier & Son, 537 Falls Ave., Youngstown, O. Est. $40,000.

Pa., Phila.—DYE—Fairmount Dye Wks., Cedar and Cambria Sts., 2 story, basement, 43 x 63 ft., brick, steel, plain found., Cedar and Somerset Sts., to Wintz Bros., 1618 Sellers St.

Pa., Phila.—American Cigar Co., 1111 5th Ave., New York, 4 story, basement, 100 x 170 ft., rein.-con., brick, steel factory, plain found., to Turner Constr. Co., 1700 Walnut St.

Tenn., Chattanooga — BAKERY — Patterson Corp., 4050 Penn. Ave., Kansas City, Mo., 1 story, 139 x 189 ft., brick, steel, rein.-con., to Fogel Constr. Co., 619 Reliance Bldg., Kansas City, Mo. Est. $80,000.

Tex., Natalia—CERAMIC PLANT—See "Bids Asked."

Ont., St. Catharines—FACTORY—McKinnon Industries division of Genl. Motors of Canada, H. J. Carmichael, mgr., soon lets contract (1st unit), 1 story, 120 x 480 ft. addition, Ontario St. $175,000. Total $3,000,000. Private plans.

Sask., Regina—BAKERY—McGavins Bakery Ltd., 2 story, basement, 115 x 115 ft., rein.-con., brick, terra cotta, to Wilson & Wilson, Regina. $125,000.

GARAGES

Proposed Work

Ky., Louisville—Hurry-Up-Broadway Co., 329 East Bway., plans by B. B. Davis, Columbia Bldg., 1 story, 90 x 160 ft., Jackson St. and Bway. $100,000.

N. Y., Brooklyn—Calxco Realty Corp., D. Wolfson, 16 Court St., plans by S. C. Rice, 26 Court St., brick, concrete, garage and gas station, Gravesend Neck Rd. and 26th St. $40,000.

N. Y., Brooklyn—Barmmill Constr. Co., c/o B. Miller, 1363 47th St., plans by J. J. Millman, 26 Court St., 95 x 150 ft., brick, concrete, 39th St. and 14th Ave. $45,000.

N. Y., Brooklyn—Rosnet Constr. Co., S. Steinberg, pres., 7201 Fort Hamilton Ave., plans by Bennett & Koeppel, 7826 5th Ave., 2 story, 70 x 134 ft. brick, steel, 92nd St. and Fort Hamilton Ave. $40,000.

N. Y., Jackson Heights (sta. Flushing)—J. Voorhess, owner and archt., 114 East 54th St., plans 100 x 200 ft. service garage, 78th St. and Roosevelt Blvd. $50,000.

O., Columbus—McClure-Nesbitt Motor Co., J. McClure, genl. mgr., 1503 East Main St., plans by R. Sims, 55 East State St., 1 and 2 story, 86 x 165 ft., concrete, brick, terra cotta, East Main St. $65,000.

Contracts Awarded

Ind., Kokomo—F. D. Miller, 115½ North Buckeye St., general contract 1 story, basement, 100 x 204 ft., brick, steel, to A. Wolfe, Logansport. Est. $60,000. Noted July 4.

Mass., East Boston (sta. Boston) — L. Mastrolia, c/o contractor, 2 story, irregular sized, brick, stone, steel, auto equipment, service and repair garage and gasoline station, plain found., Day Sq., to A. De Simone, 239 Bway., Arlington. Est. $40,000 or more.

SHOPS AND FOUNDRIES

Proposed Work

O., Cuyahoga Falls—Kent Machine Co., plans by George S. Rider Co., Century Bldg., Cleveland, 1 story, 70 x 100 ft., brick, steel machine shop. $40,000.

POWER PLANTS

Proposed Work

Calif., Compton—Southern California Edison Co., Edison Bldg., Los Angeles, brick, substation. $200,000. Private plans.

N. Y., Yorkshire—Niagara, Lockport & Ontario Power Co., Marine Trust Bldg., Buffalo plans electric plant.

Okla., Hollis—Preliminary plans installing 120 h.p. Diesel engine generator set in water plant. $70,000. W. E. Geer, city engr.

Bids Asked

D. C., Wash.—Aug. 22, by District Comrs., District Bldg., remodeling power plant at Gallinger Hospital.

Ill., Chicago—Columbia Tool Steel Co., A. T. Clarage, res., Chicago Heights, taking bids 52 x 64 ft., brick, steel, power plant. Sessions Engr. Co., 228 North LaSalle St., engrs.

Contracts Awarded

Tex., San Angelo—West Texas Utilities Co., San Angelo and Abilene, increasing capacity of power plant by 17,500 hp. steam turbo generator, to Allis-Chalmers Mfg. Co., West Allis St., Milwaukee, Wis.; two 1,000 hp. boilers, to Babcock & Wilcox, 85 Liberty St., New York.

WAREHOUSE

Proposed Work

O., Cleveland—WAREHOUSE and OFFICE—Crucible Steel Co. of America, F. E. Phelps, dist. mgr., 721 Lakeside Ave., warehouse, 150 x 180 ft., office, 114 x 148 ft., both 1 story, brick, steel, concrete, East 55th St. $150,000. Private plans.

Contracts Awarded

Ia., Sioux City — WAREHOUSE — Julius Andrae & Sons, Dorce and Iowa Sts., 2 story, basement, 150 x 150 ft., rein.-con., plain found., Dorce and Virginia Sts., to W. A. Klinger, Warcock Bldg. Est. $100,000.

Neb., Omaha—FREIGHT HOUSE—Chicago, Rock Island & Pacific R.R. Co., W. H. Petersen, ch. engr., Chicago, Ill., 1 and 2 story, 32 x 360 ft., brick, concrete 16th St. between Mason and Pierce Sts., to Parsons Constr. Co., Grain Exch. Bldg., Omaha. Est. $65,000. Noted Jan. 17.

Tex., San Antonio—WAREHOUSE—Texas Co., 720 San Jacinto St., Houston, bulk oil station facilities, incl. warehouse, 52 x 177 ft., garage 30 x 182 ft. both hollow tile, concrete and steel fill shed and concrete platform, 10 x 26 ft. pump house, retaining found., 12 x 28 ft., rein.-con. and brick supports for four horizontal tanks 10 x 38 ft. some concrete paving and sewers, to J. M. Chitten, 401 Ruiz St., $69,368.

See proposal advertising on page 133

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UNIT PRICES

Road—California

U. S. Department of Agriculture, Bureau of Public Roads, District No. 2, San Francisco, opened bids May 21, Topaz Highway Route No. 36 in California and No. 5 in Nevada, 12.22 mi., 18 ft. wide, Mono and Douglas Counties. Lowest three and highest bidders are: (A) C. G. Willis & Sons, 2119 East 25th St., Los Angeles, (awarded contract); (B) Isbell Construction Co., Carson City, Nev.; (C) Tieslau Bros., Berkeley; (D) Contoules Construction Co., San Francisco.

	A	B	C	D
117,800 cu.yd. excav., unclass.	$0.40	$0.50	$0.50	$0.73
1,440 cu.yd. excav., unclass., structure	1.50	1.50	1.25	1.50
7,200 sta.yd. overhaul	0.02	0.04	0.05	0.05
12.22 mi. finishing earth graded road	350.00	100.00	400.00	100.00
315 cu.yd. class "A" conc	30.00	35.00	35.00	30.00
121 cu.yd. class "B" conc	28.00	35.00	35.00	30.00
27,990 lb. reinforcing steel	0.06	0.07	0.08	0.08
3,852 lin.ft. 18 in. culvert metal pipe placing	2.50	0.50	0.60	0.90
588 lin.ft. 24 in. culvert metal pipe placing	3.20	0.50	0.75	1.10
104 lin.ft. 30 in. culvert metal pipe placing	4.00	0.75	1.00	1.50
1,100 cu.yd. hand laid rip-rap	6.00	3.00	4.00	4.00
66 lin.ft. removing existing culverts	0.75	1.50	1.00	1.00
3 mi. moving existing right of way fence	150.00	275.00	350.00	300.00
3,852 lin.ft. 18 in. culvert metal pipe furnished on project	0.50	1.50	1.30	2.05
588 lin.ft. 24 in. culvert metal pipe furnished on project	0.75	2.25	2.00	2.90
104 lin.ft. 30 in. culvert metal pipe furnished on project	1.00	3.25	2.50	3.70
Totals	$89,717	$93,750	$98,263	$125,890

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Road—New Hampshire

State Highway Department, Concord, opened bids May 24, 2.52 mi. 20 ft. highway in Charlestown Township, 6 in. concrete on 8 in. gravel base. Six bids were received, difference between lowest and average 26 per cent. Lowest three and highest bidders are: (A) B. Perini & Sons, Inc., Ashland, Mass., (awarded contract); (B) Lane Construction Corporation, Meriden, Conn.; (C) W. H. Hinman, Medway, Mass.; (D) F. E. Ellis, Melrose, Mass. E S. Hastings, Keene, N. H., engineer.

	A	B	C	D
5,625 cu.yd. earth excav	$0.57	$0.75	$0.70	$1.02
53,572 sq.yd. fine grading	.05	.07	.05	.05
9,085 cu.yd. borrow gravel	.85	.85	1.00	.95
10 cu.yd. ledge excav	.57	3.00	4.00	3.00
3,329 cu.yd. gravel base course	1.15	1.00	1.00	1.42
29,780 cu.yd. 1 course recond. pave	1.95	1.90	2.25	2.50
16 cu.yd. class "B" conc	25.00	25.00	25.00	30.00
136 cu.yd. class "C" conc	20.00	22.00	20.00	22.00
1,601 lb. reinf. steel	.06	.10	.07	.07
138 lin.ft. laying 12 in. R.C. pipe	1.00	1.00	1.00	1.50
40 lin.ft. laying 15 in. R.C. pipe	1.25	1.50	1.50	1.50
42 lin.ft. laying 24 in. R.C. pipe	1.50	3.00	2.50	2.00
2 catch basins	80.00	75.00	80.00	100.00
12 manholes reset	8.00	15.00	10.00	15.00
72 lin.ft. wood guard railing	.55	.60	.60	.70
1,220 lin.ft. wire cable rail wrought pipe	.60	.60	.60	.80
Removing trees (3)	15.00	40.00	7.50	15.00
Working days	50	50	50	50
5,280 lin.ft. maint. of detour	.08	.10	.05	.25
Resetting grate valves (5)	8.00	5.00	5.00	10.00
Totals	$83,014	$84,264	$94,477	$106,761

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Viaduct—Chicago, Ill.

Commissioners of Cook Co., County Bldg., opened bids May 20, Burnham Avenue Viaduct. Eleven bids were received, difference between lowest and average, 12 per cent. Lowest six and highest bidders are: (A) Great Lakes Construction Co., 306 South Wabash Ave., (awarded contract); (B) Jaicks Bros.; (C) Minder Construction Corp.; (D) M. E. White Co.; (E) Oltendorf Construction Co.; (F) Allied Contractors, Ind.; (G) Mackie, Thompson, Tamm, Inc. James C. Russell, supt. Public Service.

	A	B	C	D	E	F	G
14,003 cu.yd. conc. (class A) exclusive of reinforcing steel	$12.52	$13.90	$15.00	$16.00	$16.00	$16.25	$20.80
2,415,581 lb. reinforcing steel	.0332	.035	.04	.0425	.03	.04	.045
339 cu.yd. conc. hand rail, class X	31.03	30.00	40.00	36.00	35.00	42.70	45.00
1,835 sq.ft. bituminous felt	.33	.20	.10	.39	.25	.24	.15
110,361 lb. cast iron rockers	.076	.08	.10	.061	.08	.06	.08
31,920 lb. steel bearing plates	.056	.06	.10	.0457	.07	.07	.08
47,000 lb. steel expansion guard	.057	.06	.10	.0915	.10	.07	.10
2 bridge name plates	93.00	50.00	25.00	81.60	50.00	50.00	25.00
9,703 cu.yd. excav. and backfill	1.23	4.00	1.50	2.50	4.00	1.75	2.75
686 cu.yd. class X conc. roadway slab steel spans	20.59	15.00	16.00	18.00	20.00	20.00	35.00
8,271 sq.yd. class X conc. 4 in. pavement	1.33	1.25	1.25	.93	1.50	1.20	2.20
2,151,268 lb. structural steel	.054	.05	.055	.0462	.0515	.06	.053
86,800 sq.ft. reinforced gunite	.42	.60	.47	.40	.44	.36	.46
70,200 lb. blast plates including fastening	.074	.07	.10	.056	.076	.05	.072
8,312 sq.ft. standard 10 in. partition tile	.29	.20	.30	.40	.30	.25	.35
2,495 sq.ft. standard 8 in. partition tile	.25	.18	.25	.34	.25	.20	.30
21,190 lin.ft. treated piles	1.49	1.75	1.25	1.18	1.75	2.00	1.00
363.1 M. ft. b.m. lumber including hardware	87.52	85.00	100.00	78.75	95.00	80.00	110.00
6,620 sq.ft. steel traffic plates	.89	.75	.50	.71	1.25	1.00	1.25
4,690 sq.yd. 7 in. conc. pavement	1.93	2.00	1.75	1.79	1.95	1.75	2.30
410 lin.ft. 12 in. vitr. sewer tile	1.63	2.00	1.50	3.00	1.45	2.00	1.25
1,350 lin.ft. 18 in. vitr. sewer tile	2.56	2.50	2.00	4.75	1.80	2.50	2.50
1,660 lin.ft. curb and gutter	1.64	.75	1.00	1.25	.70	1.00	1.10
8 standard T catch basins	103.00	50.00	50.00	40.00	25.00	40.00	50.00
14,847 sq.ft. (0.10 in.) wire mesh	.0308	.10	.04	.046	.05	.10	.05
2,700 sq.ft. sidewalk	.165	.25	.30	.20	.25	.30	.30
Steel bridge to be removed	552.00	500.00	500.00	2,215.00	500.00	1,000.00	1,500.00
16,347 cu.yd. approach grade (borrow)	1.04	1.00	1.75	1.00	1.00	.70	1.00
300 cu.yd. old masonry (removed)	11.37	4.00	1.00	8.00	5.00	5.00	5.00
206 cu.yd. stone	5.27	3.00	2.00	2.50	3.00	5.00	3.00
93 cu.yd. screenings	4.85	3.00	2.00	2.50	3.00	5.00	3.00
500 lin.ft. 6 in. shale drain tile	.47	.50	.30	.46	.35	.50	.25
2,645 lin.ft. pipe railing	3.34	3.50	1.00	5.50	4.00	3.50	1.50
Totals	$596,696	$648,865	$659,031	$653,701	$672,625	$688,443	$776,470

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